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T R E A T I S E
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H U S B A N D R Y
O N T H E
I M P R O V E M E N T
O F
D R Y and B A R R E N L A N D S.

S H E W I N G,

- I. The many Advantages which would arise to the Nation in general, by destroying of Warrens, and converting the Lands into Tillage, Pasture, &c.
- II. Pointing out new and cheap Methods to make growing Fences upon the most Barren Soils, and how to Till and Manure the same at a low Expence.
- III. How to prepare the Land, and Raise upon it Various Sorts of Plants, to produce both Poles and Timber.

By T H O M A S H I T T,
K
Author of a TREATISE ON FRUIT-TREES.

D U B L I N :

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OF

MUSGRAVE

OF

IMPROVEMENT

AND



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THE P R E F A C E.

AFTER so many large and learned Treatises upon the subject of Agriculture, I imagine this will be thought superfluous: but as I write with an intent of being of service and assistance to my Country, that determined me to publish this Treatise.

What chiefly induced me to this undertaking, was a visible want of Men to defend his Majesty's Dominions, and the Poor complaining of the scarcity of Bread.

There are large tracts of Land in the Nation which lie uncultivated, and at the same time capable of producing plentiful crops of Corn. Those Countries may be too thin of Inhabitants to till the Land; but were there habitations erected, the number of people would increase, as well as the quantity of Corn; and in all probability, would relieve the grievances I mentioned.

There are many Gentlemen Proprietors of uncultivated Lands, who are sensible of the advantages which would arise by destroying of warrens, and converting the land into Farms; at the same time many such estates belong to Noblemen or Gentlemen who reside at great distances: and being perhaps engaged in publick affairs, they have not leisure or opportunity to observe the quality of their Lands, though are zealous to contribute to the good of the Nation, according as there is a necessity.

Those Warren-Estates which belong to Landlords residing at a distance, often prevent other Gentlemen in the neighbourhood from making improvements, for the rabbits would destroy the hedges, corn, &c. upon the Lands adjoining: but were there a general concurrence for the demolishing

ing of warrens which join each other (upon Land that would produce corn) this would be of great advantage to the Nation.

I am sensible some of the owners of Warren-Estates are informed, that the letting of their Land for that use is the greatest advantage that can be made of them; but by my calculation it appears to the contrary: I affirm to be just; as to the expence that would attend the work and the profits that would arise: and I hope some Noblemen and Gentlemen, will execute the plan I have given.

There are some Commons whereon furz grow, which the poor make their fuel. Now if such Lands were converted into private properties, it might possibly be deemed a robbery committed upon the needy; however, if the poor could not obtain any thing else to burn, there might be apart reserved for their use only, and one acre fenced from cattle, would produce as much as ten where Sheep, Goats, Affes and the like, frequently feed.

The Rules I have given for Inclosing, Tilling, Manuring, &c. of Dry and Barren Lands, are such as I caused to be practised with good success; and I hope many others will reap benefit from them.

I have mentioned in the first Part, a possibility of improving other sorts of Land, besides what I have given directions for: I have not at present leisure to give Rules for the doing of it, but if I be applied to, either personally or by letter, will give my advice to any one that does me the honour to require it.

Chislehurst, April 4 1760.
At the Right Honourable
Lord ROBERT BERTIE's

T H E

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AN INTRODUCTION
TO
AGRICULTURE.

AGRICULTURE has always been a most useful employment for man. It is well known the Almighty sent Adam to till the land, and at this time it is a work still necessary for the support of human life. It is not, however, carried on in all places to such an advantage as might be; for there is much land at present but of little use, which by proper culture would produce corn, and many other things for food, likewise wool for clothing, and also timber; all lands are capable of improvement, none being so profitable by nature as they are capable of being made by man's assistance. And if Agriculture was more universally understood, great advantages might be made with very little expence; I have observed a great want of knowledge in this particular, and upon asking husbandmen why they let large tracts of their farms lay untilld, they have told me it was owing to the want of manure, without which they could not reap any advantages from their labour; but this I have found to be not a real, but imaginary want, in places where lime might easily have been procured. But many farmers have entertained a notion that there is no other enrichment for land, but such as proceeds from the ex-
Bcrements

crements of cattle. Admitting such an opinion to be just, there could not, indeed, be many improvements made, for such manure is not to be had in all places where lands want improving; and if it could be purchased, at a great distance, the carriage would cause it to come excessively dear. But this matter is likely to be best understood by such gentlemen as have taken the pains to peruse Mr. Tull's learned treatise of Husbandry. I do not pretend to deny the usefulness of any sort of excrements, provided they can be easily come at; but if not, there are manures to be found of various sorts, either in or near most lands that require them; but where the soil is chiefly sand and pebble, there they are the scarcest, though if the land has not been tilled before, there generally is ling or some other vegetable, the burning whereof will produce salts which greatly improve the soil; and near such land there frequently are vallies with the soil of a black colour, called Moor or Moss Earth, which either with burning, or otherwise, becomes likewise a good manure.

Where there is a rock near the surface, lime might be made at a reasonable expence, yet the use of it is rejected by many farmers, as believing it to be too hot for such a soil; but I know by experience that a proper quantity, duly prepared and applied thereon, has had a good effect, and likewise upon gravelly lands, which are generally called the most hot and burning: I will not attempt to prove that lime is either hot or cold, or whether it be naturally impregnated with salts, or imbibes them from the atmosphere; but this I know, that the soil wherewith it is mixt, will produce better crops than others of the same sort, and will continue moist a longer time in summer. Soot and pigeon's dung are excellent manures, though I have heard them deemed too hot;

hot ; but I know them to be as serviceable, if properly used, as lime is upon the same sort of land. Marle in a greater quantity has as good an effect upon the forementioned soils, but it is not frequently found near them. The last mentioned manures I should chuse to make use of on old tillage, or else where the soil is too full of stones (or large pebbles) to be floated ; but where that can be performed, I recommend the burning of the surface as the cheapest manure, and most effectual of any, to many sorts of poor land ; for it not only adds salts to it, which the burning of grass-roots produces, but it opens part of the stratum of clay next the soil so much, that the roots of vegetables can afterwards feed therein, for when the turf of a piece of land has been burnt in heaps, at four or five yards apart, though all the ashes be taken away with some of the earth, and spread over the other parts of the land, yet neither corn nor turneps will grow so vigorously there, as on those places that were only opened by heat, and afterwards pulverised with the plough and harrow. Burning has the like effect on gravelly, chalk, or creach land, and where there is a sharp sand next the soil, burning softens it and renders it more fertile than before. As the burning changes the property of the earth below, it may be deemed to increase the quantity of soil, for none other is called so but that sort of land wherein the roots of corn or grass can feed. If land be in open fields, the first improvement is to be made by inclosure (where it is possible to be done), then it will be in the power of the possessor to order it according to his pleasure ; but where they cannot be inclosed, there may be greater advantage made of them, than what there is by the general practice either in meadow, tillage, or pasture.

Those sorts of lands, as produce a large quantity of hay, or such grass as will fatten a large ox (in three or four months), are the least capable of improvement, admit they be continued, either meadow, or pasture, though nature may be assisted many ways, viz. by destroying ant-hills, moss, or weeds, as there are frequently some or other of them on the best sort of land, if it has remained untilled for many years; for on sand-land there is generally moss, and on clay ant-hills, and on both some kind of weed. There are lands that have few other, but good sorts of grass growing on them, though not in so luxuriant a manner as in some that have been latelier plowed; in this case tilling is required to make the surface more porous, that the roots of grass may more freely extend themselves, and the rains in summer more readily enter therein; the same method would be of great use, where some of the grass is of a bad sort, for by tilling the bad might be killed, and good sorts only of durable grass might be propagated; and by plowing, profitable crops of corn, turneps, &c. might be obtained. Some lands are covered with growing goss, thorns, briars, broom, ling, &c. or such grass as cattle will not eat with pleasure, or if they be obliged to live upon it, they will not thrive; yet those lands might be brought to produce such grass as would fatten sheep or small oxen.

In many parts of this kingdom there are sides of mountains so very steep, that it is impossible to plow them, and the surface of some of them little else but stones; yet if they are not too steep for a man to ascend, they may be improved, for there are many kinds of trees will grow in such situations, and the lands will thereby become more profitable than if they were stocked with goats, or rabbits, which is most commonly the use of such lands.

If the whole breed of wild rabbits in the nation cannot be spared, I could wish they were confined by stone walls to such lands only as cannot be plowed; for where they feed upon other sort of land, they greatly obstruct improvement, especially where warrens are in open fields (as the greatest part of them are). I shall attempt to shew the great injuries done by rabbits, but I will first explain what is meant by an open field, and likewise describe the nature of warrens, which though they are well known to most Gentlemen, yet I apprehend many of my readers may want to be informed.

An open field is a large tract of land, wherein many persons have a part; and though one man's property is not divided from another's by any sort of fence, yet each proprietor knows his particular portion, both for plowing to sow with corn, and mowing the grass to make hay of. In some lordships there are great quantities of land, which are neither plowed nor mowed, nor has any one a particular part as his property; such lands are called commons, and every person that has a share of them, may send his cattle there to graze; some of these are called commons without stint, where every one of the proprietors have a right to keep what cattle or sheep upon it he likes, according to the kind of cattle they are adapted for; and on some commons all kinds go together; there are other commons where the number of stock is limited, these are called stinted commons; after the hay and corn is moved off the ground, the cattle belonging to the proprietors thereof graze promiscuously together therein, in like manner as they do upon the other commons. Some of these are the property of one person only, but divided among several tenants: and in some lordships many Gentlemen have part, but there is seldom any more than one has any

share in the Royalty, and sometimes he who has that, does not own much of the land, though he is deemed Lord of the Manour. In some parts of England there are many open lordships which join to each other, without any sort of fence betwixt them, yet their boundaries are known, and the cattle of the one has not any right to feed on the other. Inclosed lordships are those which are divided from all others, with walls, hedges, ditches, rails, pails, or the like; and within their bounds are many parts fenced in like manner, and by such fence every person's stock is kept in his own grounds, and not mixed with others, as in open lordships.

Warrens are the names of those lands which are appropriated for rabbits to breed and feed in, and the persons who have the care of them, are called Warreners; some are only servants to the Gentleman who owns the land, but many are tenants, called master warreners, and the increase of the stock is their property; but the owner of the land can claim a certain number of breeders to be left upon the warren, suppose the tenant quits it. Burrow is the name of the holes in the ground where the rabbits flee to, when they are apprehensive of danger; and when a new warren is made there are large banks of earth thrown up, and holes bored in them of a size sufficient for a rabbit to enter into, and a breeding stock are brought there, and as their number increases they make holes themselves; for that reason they chuse light sand lands, it being easier to work into than clay.

Though many warrens are in open fields, yet their boundaries are known, and marked with either stones or little hills of earth erected for that purpose. Some warrens are upon such commons as the farmer's sheep (belonging to the lordship) go on, neither is there any sort of fence about them;

them; these sort of warrens are generally the property of the Lord of the Manour, though perhaps he has but little share of the other lands, yet his tenant has a greater property in the common than others; for he has a right to keep any sort of stock upon it besides rabbits, and none of the others have. Where the whole lordship is the property of one Gentleman, and divided amongst many tenants, if there be a warren upon the common, there is the like indulgence granted to the warrener as on the former: there are other warrens on lands which are the warrener's property only, and the stock belonging to any other person has no right to feed thereon. These, like many others, are but seldom effectually fenced round with stone walls, though sometimes there is one made of fods that will keep beast or sheep out of the warren, but will not long secure the rabbits within, for as they do not love confinement, they soon find means to get over it, or work through it, and in the nights go to feed in places distant from their burrows; often on the property of farmers, who at great labour and expence have raised growing crops of corn, turneps, cole, clover, or any other sort of grass, which makes a pleasanter food than that which grows near the burrows; I have known them go more than half a mile from the burrows, to feed upon such crops, which tended greatly to the owners disadvantage: and where the farmer and warrener have been tenants to one lord, the former has been obliged to submit to the loss sustained; for when complaints are made to the landlord, the laborious tenant seldom meets with redress, the warreners being generally indulged.

The farmers meeting with such losses, occasions much land to be untilled that is capable of producing profitable crops of corn, turneps, &c. for where they are near to warrens they chuse rather

to lose the natural product of the land, than run the risk of losing their crops, after the expence of plowing, manuring, &c.

Warrens are of no less bad consequence, when the rabbits feed upon the properties of such farmers as are independent of warreners landlords; those men generally employ persons to kill rabbits upon their lands who sometimes are tempted to pursue their diversion further than they have a right to do; and when a warrener discovers such practices he prosecutes the offenders, who often suffer imprisonment or banishment; and many of these men who have been accustomed to kill rabbits, having contracted an aversion to labour, pursue this practice in other parts of the country, or become horse-stealers, and highway-men, and at length arrive at the gallows. When rabbits trespass upon inclosed lands, it causes some farmers to make burrows, and to turn part of their land into a warren; by this means tillage is neglected, and the breed of rabbits increased, and at the time of killing, disputes arise betwixt the farmer and warrener, for each of them takes all they can meet with upon their own land, without any regard to real property; in such situations a farmer, who has not rabbits of his own, becomes a great sufferer, not only by his loss of grass, or corn, but by having his hedges injured, for rabbits eat the young hedges, and damage others by burrowing amongst their roots; so that these destructive animals not only prevent many improvements which might be made by tillage, but likewise others that are as material, viz. planting to inclose lands with growing fences, and likewise the raising of timber upon such lands as go at a small rent.

There are some people who maintain that warren-lands are incapable of improvements, if there were

were no rabbits upon them ; and the reasons they have given are as follow :

Not any sort of vegetable, say they, would grow, but those bad kinds that are there by nature, except more money was sunk in the improvement, than the yearly rents would pay five per Cent. for.

They likewise alledge an impossibility of procuring manure, and even that some of those lands which have been plowed have become worse than before. I think myself obliged to answer these objections to improvements ; for I have said there is a possibility of rendering those lands more profitable to the owners than they are at the rents they are generally let at to master warreners. I have already shewed the possibility of meeting with manure.

I will in the first place endeavour to prove, the possibility of such lands producing corn, turneps, or clover, and after that durable grass, which would be proper feed for either horses, cows, or sheep, and likewise such as would make fodder to support them in winter.

Secondly, I will point out the reasons why such lands have been often worse after plowing than they were before.

Thirdly, I shall endeavour to shew that white-thorn, or any other plant proper for hedges will grow there, as well as several kinds of trees for shipping, with many others that would be useful in building, fencing, or to burn, &c.

Fourthly, I shall make it appear, that the yearly rents after the improvement, will pay near ten per Cent. for the money sunk in making them ; and if made into farms, that the advantages would be reaped the second year ; by planting with trees the profits would be greater, though not so early as from tillage.

As to the first objection, this has been found ground-

groundless by some of the master warreners, who after fencing part of their land so as to make it secure from rabbits for two or three years, have sowed it with turneps, clover, and various sorts of grain ; those lands, indeed, which have been tilled by warreners seldom produce better grass after, than before, yielding little else than thistles, nettles, wormwood, or the like ; but this has been owing to the land not being properly managed, for there is a possibility of causing good sorts of grass to grow there.

Warrens are generally upon dry land, where the soil is of such a loose nature as to be plowed in the driest seasons ; by this means, most sorts of weeds may be killed, especially wormwood, horehound, ling, and in many places large quantities of yellow grass, commonly called prie or oate-grass.

These being such as the rabbits refuse to eat, for this reason they are most discernable ; though they are far from being the best kinds that those lands naturally produce, for there may be found there both trefoil, and clovers red and white ; but these last mentioned are such pleasant feed for rabbits that they hardly suffer their leaves to grow before they eat them ; such constant cropping greatly weakens the plants, and kills many of them, so that the worst increase, 'till most of the land is covered with them. As there are some good kinds of grass which grow naturally upon warrens, there is no reason to doubt but their whole produce might be rendered equally good, by sowing proper seeds after the bad were killed by proper tillings.

I have never had any land under my care that has ever been a warren, but lands adjoining to warrens, and of the same nature, I have made to produce good turneps, then barley, and the years following trefoil, clovers red and white, and

and where there was a rock near the surface saint-foine.

These improvements I have made without any other sort of manures than what the land produced by burning the surface.

Where parts of warrens have been tilled, I have had many opportunities of seeing how it was done, and can in some measure account for such lands being worse after plowing than they were before: Future improvement was not aimed at, but early profits only; those who reap the most, pare and burn the land first, after that plow it and sow it with turneps or cole; but if it be only once plowed, that is not sufficient to kill all the roots of those unprofitable vegetables that grew there before, yet there might possibly be a tolerable good crop of turneps, or cole, by such tilling.

It is customary to sow such land next spring with barley or oats, either of which will prosper after the former improvements by burning, &c. provided the turneps or cole be eat upon the land by sheep, for their excrements greatly enrich it; sometimes they sow in the autumn (after the barley or oats are reaped), with wheat or rie; and after they have got that crop, they suffer the rabbits to feed as before, or perhaps they may sow with the oats or barley in the spring the seeds of red clover; they generally mow once, and sometimes twice the second summer after sowing. In the autumn they often sow with wheat, but not any kind of grass seeds proper for the soil, and if any such grow there by nature, they are destroyed by the rabbits feeding upon them so soon as the corn is carried off the land, for then they have not got much strength of roots; so that after plowing, the land has no better kinds of grass upon it than before: There will be perhaps not so much prie as before, for the burning must have destroyed part of the roots; but there being only one tilling in summer,

summer, part of them are left alive, which increases fast when the land is become tender by plowing; they become more numerous also in a few years by the seeds they annually shed; there are generally many more thistles, and of various kinds, by such culture than there were before, for their seeds are easily conveyed by the winds to distant places, and where they meet with a proper covering, they will there grow, if there was not any to be seen in the land before.

Those thistles which have horizontal roots with many joints in them, generally increase much when they are in such land as is only plowed in the spring or autumn, for being thereby rendered more tender, the roots freely extend themselves; in those seasons too there generally is moisture enough in the earth to encourage their growth; and if there be fern in the land, or many other kinds of weeds with such roots, they increase the same as the thistles; and the oftener that land is tilled in such manner, the more weeds it produces afterwards, and many of them are of such kinds, that they kill the good sorts of grass which would otherwise grow there.

I have observed parts of warrens plowed without being pared and burnt, this has been repeated three or four years successively, and the land sowed with oats, pease, or rie; but I could perceive this method was less profitable than the former, the land producing much worse crops, and being fuller of weeds; this was owing to the want of fire to destroy many of the roots and seeds of such weeds; the fire would have extracted such salts from them; as much improves a crop of any sort of grain; but plowing without burning being the least expence, it is therefore preferred by such as like to deal safe; for suppose they were not to get any crop, their loss would only be the small rent of the land, with the value of the seed, and plowing.

There

There are other lands besides warrens (of the like sort of earth) that are made worse by plowing, and this notwithstanding they have had summer tillings, have afterwards been laid down with grass seeds and never had a rabbit fed upon them: I have strictly enquired into the cause of their barrenness, and find it owing to several causes; the first and principal proceeds from their having been a long time tilled with little of any sort of manure mixt with the soil; some such lands too being in bleak situations, great part of the earth has been swept away by the winds, or carried off by violent showers of rain; so that from either of those causes little else than small stones, or rock, has been left near the surface; some lands again have been sowed with grass seeds, but not of kinds proper for the soil; others having had more than one crop of corn sowed upon them after a summer's tilling; this has not only exhausted too much of the salts from the ground, but has likewise given a great opportunity for the weeds to increase.

I think the raising of hedges upon such warrens as are plowable, is very possible to be done: at the same time I know there have been several attempts made without success upon such lands; but the cause of their not prospering I have found either owing to the want of proper care after planting, such as not keeping clean from weeds, or not guarding them from cattle, or to the want of judgment in the planters; many of whom plant white-thorns, or such like for hedges; they are apt too to make use of one method only upon all kinds of lands, though there ought to be a great difference betwixt good land and the soil here mentioned; but though some attempts have proved fruitless, yet all have not been so, as may be seen by persons who travel over such lands, for either thorns, maples, hollies, or hornbeam of a large size are to be found growing upon many warrens; nay there
are

are scarcely any but have some or other such growing upon them, or at least upon the lands adjoining with the soil alike; and if there be single plants growing, there is no reason to doubt but greater numbers would, as they would be a shelter to each other; and by experience I know, that either thorns, hollies, hornbeam, or maples, will grow extremely well. The latter, however, I should chuse if they can be come at, for on dry lands they grow the quickest, but are very scarce in woods, for mice are extremely fond of their seeds, and the greatest part are eat by them, but they may be raised in nurseries.

From what I have said as to hedges growing upon warrens, I imagine any person may reasonably think other trees will; and woods are not only a great ornament to an estate, but likewise very advantageous, especially where there are but few; which is generally the case where rabbits are most plentiful, notwithstanding the soil is very proper for most kinds of forest-trees; yet many gentlemen who have such estates, neglect planting; for were they to do it, say they, it would be sinking of money without reaping any profit from it in their age, and it would also lessen their yearly rents.

The age a person may live to is no doubt very uncertain; yet the work of planting is not so dead a weight upon an estate as imagined by many; for the money sunk in the work, and other necessary care after, will not exceed eight pounds per acre, including the expence of inclosing if wanted: and the rents of many large warrens that I know fit for planting upon, are not let for more than one shilling per acre; and if the kinds of trees be rightly adapted to the soil, the money sunk in the work will be received at the end of twenty years, with compound interest, and likewise the rents of the land.

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As there are four thousand eight hundred and forty yards of land in an acre, it may reasonably be imagined that as many trees may grow upon it to the size of hop-poles; but suppose there be only three thousand large enough at the time of cutting, and they be only sold for three shillings a score, they will come to twenty-two pounds ten shillings, and that is nearly equal to the first expence, with compound interest upon it at five per cent. and the rents of the land at one shilling a year; the expence of cutting may be paid by the brush-wood (for burning), and the small poles for hedge-wood, hurdles, or many other uses.

At the first time of cutting there ought to be a hundred and fifty trees left upon each acre, of such kinds that make large timber, though that is more than can thrive to a great size, yet they will be a shelter to each other, and they may be thinned as necessity requires, at each time of cutting, and that may be in less than twenty years, and every time will be more profitable than the first; besides, there may be ten trees, at least, remaining upon each acre to make timber, without injuring the poles, and when they are come to a size fit for ship-timber, then each time of cutting will be still more valuable than before, when there were only poles.

I imagine it will be said, there are but few woods which produce three thousand poles on an acre; and I know they do not where there are many hedges or thorns growing; but I do not propose that either of those are to be planted, or suffered to grow, as I shall more fully shew under the head of planting and improving woods. I know there are some warreners who endeavour to make either their landlord, or his agent, believe that not any sort of tree will grow large enough for ship-timber, upon their poor dry land (as they call it), nor even fit for hop-poles; but
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if such selfish insinuations prevail, and retard some timorous minds from making improvements, I hope there are others who cannot be so easily deceived; for in many parts of England there are large oaks growing upon dry sands; and where there is a rock too near the surface for oaks to grow, yet there elms may be produced, which for some uses are as valuable as the former.

The poles most valuable for hop-gardens are ash, maple, or red fallow; many of which are to be seen upon such dry lands as those that warrens are upon; as also firs, beach, birch, poplars, and many other sorts of wood useful in building, fencing, and firing.

I have said before, I never had the whole care of planting or making other improvements upon lands which had been warrens, but in the time of my apprenticeship at Belvoir Castle; his Grace the Duke of Rutland caused part of one to be destroyed, and there are now growing upon it firs and oaks of forty feet in height, and many of them a foot in diameter, though not forty years of age; for the oaks were sowed in the autumn 1724, and the greatest part of the firs are but two years older. In that part of the land where the oaks prosper most it is not so loose a sand as the generality of warrens are; but the other part is very dry soil mixt with small red stones, though there is not a strong rock near the surface.

The firs grow extremely well upon the last mentioned soil, and the oaks there are more than thirty feet high; and whoever observes those trees, must be convinced that the like might be raised upon other warren-lands, for this was a place where rabbits actually made their burrows.

There are some Noblemen and Gentlemen have caused walls of stone to be built round their warrens, whereby their rabbits are prevented from feeding

feeding upon other persons properties ; and this indeed is a piece of honesty due to their neighbours ; there are some few others who have acted still more laudably, I mean those who have entirely destroyed their rabbits, and converted the lands into farms, and likewise made small tenements for labourers, and other useful working people, with plantations of useful wood upon the same estates, viz. oak, elm, chesnut, fir, ash, &c.

Such works are both profitable and publick spirited, for they not only improve the estates, but they add strength to the nation, by creating employment for a great number of honest and laborious persons, and thereby raising plenty of corn, and other necessaries for their support.

I hope many more Noblemen and Gentlemen will follow such examples ; for if the like method was followed in all plowable warrens, the number of useful people would be greatly increased, and likewise the quantity of timber. The destroying of open warrens would not only furnish more necessaries of life and employment for persons that are obliged to labour, but it would likewise create more diversion for Noblemen and Gentlemen who take delight in the diversion of hunting, either fox, or hare ; there would also be more game for to shoot than at present. It is well known to sportsmen, that warreners are enemies to foxes, for they destroy them of all ages, either by engines or poison ; for if a warrener's landlord discharges him for setting traps, he will lay upon the warrens poison mixt with such ingredients as a fox likes ; and if the warreners find where a bitch has littered they will be at the expence of digging out the cubs.

As to hares, though they are not prejudicial to warreners, yet, as I have been credibly informed, they destroy great numbers of them, some by snares they set for rabbits, and others in their

nets ; for when a large tract of land is surrounded with them, there are often several brace inclosed, and none suffered to live that can be caught.

'Tis not only the destruction of game that warrens are the cause of, but they likewise render the chace very hazardous ; for many accidents have happened to gentlemen and their horses, by galloping over rabbit-burrows ; the danger is much greater than the leaps required in hunting in an inclosed country, for both man and horse are apprehensive of a hedge or ditch before they come at them ; but not so of the subterraneous caverns where rabbits burrow, 'till the cover breaks in under a horse.

In hunting countries it would be an advantage to the farmers who live there, to erect bridle-gates in their fences, by this means the hedges would be less liable to be broke down, and there would be fewer leaps to the sportsmen, which would render it more agreeable near the end of a long chace, when the strength of the horse is greatly exhausted.

The increase of game for shooting would be pheasants in the woods ; and on the farms partridges and quails ; besides hares, which yield diversion several ways.

In all probability there would be an increase of so much, as to make part of the feed for foxes, by which they would be less ravenous amongst the farmers lambs and poultry.

It may reasonably be supposed there would be fewer foxes bred, if there was not any killed by warreners, for too great a number spoils the diversion ; and Gentlemen would, to prevent it, hunt later in the spring, imagining that none would be poisoned, for that reason would rather choose to have a small number of healthy ones than

than a greater, rendered weak by poison (as some are when they have taken too little to kill them), for one of the former will make more running than three of the latter.

The expence of inclosing and building of farm-houses upon warren-lands would not be the same in all places, for in different situations the prices of materials for building, as well as workmanship, are various; but then the value of the land when inclosed, would be in the same proportion; and according to the quality of the soil, or the place where it was, lands which lay near any city, road, navigable river, or towns of great trade, would be more valuable than those differently situated.

I will shew the expence, and profits, which would arise by inclosing some warrens with which I am acquainted, about one hundred and thirty miles north of London; and for the expence mentioned, I would undertake the work: and would likewise provide undeniable tenants to take the land at the rents I shall propose.

To make an estimate, I will only suppose five hundred acres to be inclosed from an open warren, and divided into plots of the following sizes, viz.

Plots	A.	R.	P.		A.	R.	P.
2 of	100	—	—	each	200	—	—
2 of	50	—	—		100	—	—
2 of	40	—	—		80	—	—
2 of	30	—	—		60	—	—
2 of	20	—	—		40	—	—
2 of	10	—	—		20	—	—

Plots 12

Acres 500

I think the land thus divided will be convenient enough, admit there be planted round all the

several plots, either white-thorns, hollies, horn-beam, or maples, for growing fences, with others on each side, that are sufficient to guard them from being injured by any sort of animal, except deer, goats, or rabbits; for no other fence can turn them but walls of brick or stone; and either of those are a much greater expence than I am calculating for. The fences that I propose to make are much cheaper, and with some repairs, will preserve the quick nine or ten years, which will be as long as is necessary; for before the end of that time, if the hedges be properly managed, they may be plash't and become fences without any others. In high situations there is generally a scarcity of water; and to make good that deficiency, I propose to have wells sunk at the angles of the plots, in such manner that the cattle in four of them shall be supplied from one well. The next things wanting upon the farm is a house of four rooms on a floor, with a barn, stable, dove-house, and other convenient out-buildings, with a garden and an orchard, fit for a farming tenant: the expence of the whole I will place below, at the highest rates they can possibly come to.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
To surveying, plotting, fencing, and planting hedges - - -	500	—	—
To the repairs of the fences, and care of the hedges, ten years - - - - -			
To sinking of four wells, if want- ed, at 15 <i>l.</i> each - - - - -	60	—	—
To buildings, gardening, and or- chard making, &c. - - - - -			
Total expence	£.	11	10 — —

Note,

Note, As to the extraordinary expence of building houses for labourers, and making small inclosures for their use; the interest of it may be raised to ten per Cent. by setting a higher rent upon those lands than on the larger farms.

Admit a lease be granted for twenty-one years, the five hundred acres of land will be let for five shillings per acre, suppose it pays tythes in kind; but if tythe free, or only the same as when a warren, it will then be let for more; but if the yearly rent, after inclosing, be only five shillings, the whole will be one hundred and twenty-five pounds: and suppose the former rent was one shilling per acre (though it is not generally so much), the whole was but twenty-five pounds; then consequently there will be one hundred pounds a year for the interest of the money sunk in the improvements; and according to this estimate, it is nine per Cent. but as I have charged the old rent, and the expence of the work very high, I have great reason to believe the advanced profits will pay ten per Cent. for I have charged the rents of the improvement at the lowest I could possibly imagine they might be; but I will suppose a Gentleman that has an estate of this sort was to call his money in from interest, where it lay at five per Cent. he might much better employ it: for if there be fifty-five pounds ten shillings (the interest of one thousand, one hundred and ten), taken from one hundred and twenty-five, there will be sixty-nine pounds ten shillings for the rent of the land; which is almost three times as much as it was let for when a warren, as the account stands below.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
The rent after the improvement is	}	125	—
made - - - - -			
C 3			Brought

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought over		125	0 —
The interest of £. 1110, sunk in making the improvement - }		55	10 —
<hr/>			
The profit of the estate - - -	£.	69	10 —

The old rent was no more than 25 pounds, which is not much above one third of the annual profits, after the improvement is made, and the interest of the money accounted for. I recollect one objection which may be made to this estimate, and that is, great part of the money will be sunk in the improvement a year before the lands are charged with an advanced rent : this I allow to be true, since it would not be just for a tenant to pay any more than the old rent, before the land is inclosed, and the buildings finished. But there is a profit belonging to the landlord of a warren, which I have omitted to mention ; it is the breeding stock upon a warren, which is the property of the land owner ; and whenever a warrener enters upon a lease, or other contract, he agrees to leave a certain number of male and female rabbits, either in proportion to his number of acres, or to his rent ; and as they will not be of any use when the land is inclosed, they may be disposed of to an advantage equal to one year's interest of the money sunk in the work doing.

Note, The warrens I mean are the landlords sole property, and not such as the farmers sheep, &c. have a right to feed upon. Such gentlemen as like to employ servants, labourers, and horses in tilling of lands, may make a greater advantage of warren-estates than that I have mentioned, if they improve them before they are let to farmers ; and how it is to be performed, I shall shew very plainly in it's proper place, with instances of the like nature, where it has been done by others.

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What I have said in regard to the expence of inclosing, I imagine will be thought less than it can possibly be done for, or what some others have cost before ; but I declare, I am safe in my calculation, but do not pretend to do it upon old tilled lands, but upon that which is covered with grafs.

I am apprehensive some of my readers will observe, there are warren-lands let for more per acre than what I have mentioned, I grant there are such ; but they are those whose soil is of a better quality, and there might be as great an improvement made in the rents of them, as I have proposed for the other.

There are likewise plowable warrens that do not bear more than eight pence an acre ; yet they may be made worth five shillings ; and the expence of the improvement not any more than the estimate I made for lands that are let for a shilling.

I have made both observation and enquiry into the number of persons employed by a master-warrener the whole year, to preserve his rabbits in the summer, and to kill them in the customary season, which is the latter part of October, the months of November and December, and the beginning of January, when the greatest slaughter is made, and consequently the most hands required, which amount to three day-labourers for about twelve weeks, besides a man-servant, who is alone sufficient the other three quarters of the year, on an open warren, of two thousand acres of land, even where there is not any sheep or other stock, but what is the property of the warrener only, or otherwise under his care : but all warrens are not of an equal size, though the expence is generally in proportion to the quantity of land ; for if a warren be less, and there be the former number of men employed in the season, then the work is performed in less time. I will suppose the labourers in the season of killing, to be equal to one the whole

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year, upon two thousand acres of land ; now if this land is converted into four farms, there would then be four master-men, who would each of them require three men-servants, and three day-labourers to be constantly employed, besides additional help in summer for hoeing of turneps, mowing, reaping, and other necessary works.

By the above estimate, there is an inequality in the number of men employed, on an equal quantity of land, and it may reasonably be expected that the labourers would be married men ; then the farmers with their constant assistants, would be sixteen times as many families as there are upon the warrens ; and suppose a master-warrener to keep a maid-servant, each farmer must keep two, which will be eight times as many maid-servants.

I am not able to form any judgment of the number of acres of land that are stocked with rabbits in Great Britain ; but I am of opinion there is in one county a hundred thousand, exclusive of small burrows in the inclosed grounds, which are for the particular use of the farmer in his own family : suppose then that ten thousand of those acres were converted into plantations, and the other ninety into farms of five hundred acres each ; I shall shew the number of people which might reasonably be expected to live upon the premises, and compare it with the number living upon the warren, supposing one master-warrener to every two thousand acres of land, and the families of labourers, as well as of warreners and farmers, to consist of four persons one with another ; though in all probability there would be more, exclusive of servants.

Upon

Upon the warrens.

50 Masters, and in each family four per-	}	200
sons - - - - -		
50 Labourers, and in each family four	}	200
persons - - - - -		
Men-servants - - - - -		50
Maid-servants - - - - -		50
Total - - -		500

Upon the farms.

		The in- crease of people supposed.
180 Masters, and in each family	}	720
four persons - - - - -		
540 Labourers, and in each family	}	2160
four persons - - - - -		
Men-servants - - - - -		540
Maid-servants - - - - -		360
Total - - -		3780
		520
		1960
		490
		310
		3280

It may be objected by some, that I have omitted mentioning many persons the warrens cause to be employed, as hat-makers, coney-wool-cutters and the persons that hawk and sell rabbits; but I have considered all these, and am satisfied no fewer hats would be made, were the land inclosed; and as to the other employments, they are much less than would be required by the farmers for extraordinary help in summer.

I imagine it will be observed by many of my readers, that there are much fewer warrens of two thousand acres of land each, than there are of smaller sizes, and therefore my calculation may be thought erroneous, as to the families upon the warren lands: I must own, I think there are more master-

maſter-warreners than I have accounted for ; but ſuppoſe the lands were turned into farms, there would probably be ſome of them leſs than five hundred acres each; then conſequently there would be a greater number of farmers, and the increaſe of people would be in the ſame proportion as I have ſtated it.

I own, it is not every warren that is ſtocked with rabbits only, nor with ſuch ſtock as is the ſole property of the warreners, for there are many upon commons where ſheep and other cattle live upon in the ſummer, and they the property of other farmers ; but my calculation of the number of acres in a certain county (Lincolnſhire) is not hereby affected ; for if the whole of thoſe commons were meaſured, the quantity of land would be found much greater than what I have mentioned ; and, I verily believe, that were all the rabbits in the county confined to one hundred thouſand acres of land, there would not be any fewer ſheep, or other ſtock kept upon the commons than are at preſent ; neither would there be a leſs number of perſons required to till the land than I have accounted for, ſuppoſe the whole was made into farms.

The number of perſons required to cultivate the land in farms, would not be the whole increaſe that incloſure would promote; for there would be many more required to make and repair all forts of utenſils for huſbandry and houſhold-furniture, and alſo artificers for building, and their clothing would likewiſe cauſe employment for many others.

There are many other branches of buſineſs in the nation that would be improved by the produce of the land ; for it may reaſonably be expected, that every farmer would have various commodities to diſpoſe of at market, ſuch as horſes, ſheep, cows, veal, cheeſe, butter, &c. there would likewiſe be
oxen,

oxen, swine, sheep, wool, and corn of all sorts, which would yield food and employment to various persons.

I have great reason to believe too, that the corn which might possibly be raised upon the dry sandy lands in the nation, would be found to be of extraordinary service; for if more of that sort of land was tilled, the produce of each year would be more equal than it ever has been in my memory; and in all probability the price would not be so great as it generally happens to be after an excessive wet season: for when the months of March, April, and May are extremely wet, there are many large tracts of land (as the fens, &c.) which lie covered with water, and cannot be sowed; yet in dry seasons they produce large quantities of corn.

There are other reasons for a scarcity of corn after a wet spring, or summer; for the greatest part of the tillage in the kingdom being upon clay soils, which though not covered with water, yet in a wet season they are rendered improper for most sorts of grain at the season for sowing, especially barley in the spring, and wheat in the autumn. An excessive wet summer is highly prejudicial to the crops of barley upon clay lands, especially if the season was dry at the time of sowing; the rain renders the soil too wet and cold for the roots of barley to prosper, as may be seen by the leaves being of a yellow colour; whereas in seasons moderately dry they are of a dark green, and succeeded with thick strong stems, and large ears upon them; but in a wet season they generally produce ears quite the reverse, and many of the roots die without any at all; and when this is the case, the crop is not more than half so large as in a season moderately dry, neither is the corn of so great value, as being of a smaller body, and less furnished with kernel. There are also
many

many low situations, where the soil is not a strong clay, but rather inclining to sand or gravel ; if water stands near the surface in such places, the crops will decay in the same manner as those upon clay ; and in many parts of Great Britain there is much sowed that never comes to maturity, where the land is wet and cold.

There are not, however, always plentiful crops upon clay ground, though the land be dry at the time of sowing, and the greatest part of the summer be the same : For when there is a great quantity of rain the latter part of April and a dry summer after, then it renders the surface so compact a body that the roots of corn cannot extend themselves freely, so that the stems for want of supply of juices from the roots produce only a small increase.

Such dry lands as most of the warrens are, whether sand, gravel, or creach-land (which has shelly stones near, and sometimes upon the surface), are much more likely to produce good crops in wet seasons, than the former kinds are ; for if sandy lands, &c. have been properly tilled and manured in summer, though there may be large quantities of rain in the months proper for sowing, yet two dry days render them in good order for plowing and harrowing ; neither is sandy land, &c. so liable to become hard in a dry summer as clay is, though at the time of sowing there had been much rain, which is very prejudicial to corn upon clay. I own a wet spring and summer is some disadvantage to the crops upon sandy land, for then there is generally a great quantity of annual weeds ; but where Mr. Tull's excellent method of horse-hoeing is used they may readily be destroyed ; other means might be used which would be of service (but not so effectual) ; and the instruments not so expensive as the former ; but notwithstanding the weeds which may grow, yet,

yet, in such seasons sandy lands that are tolerably dry, have better crops upon them, than there are on clay.

From every farm of five hundred acres of land (admit only one third of it to be tilled), it may reasonably be expected one hundred quarters of corn would be disposed of, besides what may possibly be required by the farmers for their own use, and their labourers; and as in wet seasons these lands generally produce the greatest crops, so in all probability there would be each year an increase of corn in the kingdom. I have before accounted for ninety thousand acres which might be converted into farms in one county, consequently there would be in the whole eighteen thousand quarters disposed of at market annually, more than what there is at present, which if converted into bread and beer only, would be a reasonable subsistence for the same number of people in the families of labourers or common tradesmen; and it would likewise cause employment for millers, malsters, bakers, &c. Or if part of it was made into ale, or otherwise distilled, it would make more business for those who trade in such commodities, besides the carriage of them to the places of consumption, would employ porters and carriers, either by land or water.

The following are observations I have made on the prices of corn, and likewise of the seasons, as to their being excessive wet or dry.

In the year seventeen hundred and twenty-seven there was much rain in the summer, and in the year twenty-eight, the same in the months of March, April, May, June, and part of August; in this year wheat advanced in price, near four shillings per bushel, that is from four shillings to near eight; and barley rose from two shillings and three-pence to four shillings, at which prices they continued almost the same, for the space of a year.

year. In twenty-nine the spring and summer were dry, and the ensuing winter corn was much cheaper; wheat being sold for little more than four shillings a bushel, and barley for less than two and six-pence. In the year forty-six the spring and summer were excessively dry, and the winter following the most common price for barley was one shilling and four-pence the bushel: I remember many instances of the like sort, but have not a particular account of the years they happened in, so must omit mentioning any more, but of the year fifty-seven, when the price of corn was too well known by many, especially poor tradesmen and labourers, that work for small wages: It must also be remembered by most people what great quantities of rain fell the preceding spring and summer; and in all the time of my memory I have known it a general observation, that in the year ensuing a wet summer corn was dear, and cheap after a tolerable dry year.

These observations give me cause to imagine that there is much less dry sand, gravel, or creachland plowed, than of others; whereas, was there to be as much, or more of it, then in all probability corn would never be excessively dear, for in wet seasons the dry lands would produce the greatest crops, and be an equivalent for the deficiencies upon clay, or other low grounds. Thanks be to Almighty God there is appearance of corn enough in the nation to serve the inhabitants 'till the new be reaped, which though a very promising crop, yet the old is sold excessively dear; the cause of which, I think, must be owing to the small number of persons who have it in possession, most of whom are of the richer sort of farmers; these, when they come to market, consult together, and determine either to sell it at an extravagant price, or not at all; but if there were more dry lands converted into tillage, there would be a
greater

greater quantity of corn in the nation, notwithstanding the wet seasons which might possibly happen ; the number of sellers would be more, and consequently less liable to enter into combinations ; for in a great number some would refuse to do it, as being contrary to the laws of the nation ; and some others might possibly be obliged to sell at reasonable rates, for want of money to supply them with necessaries, and in all probability the poor would purchase their bread at a much easier rate than they do at present.

There has lately been an instance of corn settling in price, which was occasioned by a notion conceived of there being likely to be a greater number of sellers ; for in March it was reported that two ships laden with corn from Spain were arrived at Bristol, and several others expected, which occasioned the price of corn to fall in most parts of the kingdom ; but as there was not any foreign corn came into the North in the middle of April, the farmers who attended those markets raised their corn to a greater price than before : It is the opinion of some, that the great quantities of corn sent abroad is the cause of it's being so excessively dear ; but there is but little reason to imagine it proceeds from that at this time, for ever since the last harvest, or some time before, the price has been too large for it to be lawfully exported ; and if any attempts have been made to do it, they must, many of them, be without success, as our ports have been very strictly observed.

The high price of corn affects much the greatest part of the nation ; nay, I may safely say, that there is not one person in a thousand a gainer by it ; for as numbers are sufferers by it, even farmers themselves, in wet years, there are many tillers of land in the kingdom who have not only no corn to sell, but are necessitated to buy part of
what

what they use in their houses for bread, beer, &c. also seed to sow their land with. There are many others, who though they do not buy for their own use, yet are not gainers by the extraordinary price of corn ; for as in dry years there are many farmers can spare one half of what they grow, and in wet years they do not get more than three fifths of the quantity, then consequently they cannot have more than one fifth to sell, and if it should be sold for double the price, yet it does not amount to so much money as one half a full crop would do at half the price ; in wet seasons too the harvest is much more expensive than in dry ones ; the corn likewise takes more threshing, being of a smaller body, and adhering closer to the straw. There are many other disadvantages which arise to the generality of farmers when corn is dear ; those who employ day-labourers must either give them more than the common wages to purchase the supports of nature, or else they become weak, and not able to perform a common day's work ; besides the number of poor that are supported by a parish, generally increases when corn is dear, this is consequently more expence to the farmer, as the greatest part of the poor rates in the country is paid by the farmers. I would not have it understood that I think all farmers are sufferers by corn being dear, for I am sensible there are some that plow large quantities of dry sandy land who are gainers by it ; but these make a very small part of the tillage-farmers in the kingdom ; the whole number of them are much fewer than those persons that now pay so very extravagantly for their bread ; and I verily believe, that those farmers who have now corn to sell, and likewise those that have for their own use only, are not one hundredth part of the nation ; and if the price was lower there certainly must be many more gainers by it than there are at present ; also many poor families would

would be much less sufferers than they are, some of whom are too modest to be troublesome to a parish, though almost perished with hunger, of which we have had several recent instances.

Great advantages would certainly arise from the sheep which might be bred upon these lands after being inclosed ; they would undoubtedly be more healthy than many others in the nation. It is well known to many Gentlemen, and to all farmers, that a wet summer is the cause of great mortality in many of those flocks which are kept upon low moist ground, be it either sand or clay, if water continues a long time upon, or near the greatest part of the surface, except it be upon the sea coast, where the grass is so strongly impregnated with salts, as to render the blood more florid, than it is in those that feed amongst fresh water, which is often the cause of the dropsy (commonly called the rot in sheep), of which great numbers die. I need not give any reasons why they are more healthy in wet seasons upon such lands as warrens ; it is well known to every observer that such sheep have been found, whilst others near them in low grounds have died rotten.

Upon the generality of open warrens there are but few sheep at any other time than summer, when grass is the most plentiful ; for at other times the greatest part of them (if not the whole) are supported with hay, grass, turneps, or cole, on other grounds ; the natural grass upon warrens being only sufficient for aged sheep that are barren ; and even in the midst of summer, when there is the greatest plenty, the rabbits take the best, and the other will not make sheep fat ; neither do any of them thrive to be large, or to produce so much wool as they would do upon the same land, if it was inclosed and properly cultivated, for then the grass would make sheep fat in summer, and either cole or turneps (with fod-

der if required), would do the like in winter. In wet seasons, the mutton on such lands would be much preferable to a great deal of what is fed upon low grounds; there are many fat sheep killed because they could not have lived three months, consequently their flesh cannot be so palatable, nor so wholesome as that of healthy sheep, which the dry sandy land produces. I have before supposed one third part of a farm to be kept in tillage, the other to be stocked with cattle and sheep, but there ought to be some part reserved for fodder.

The stock of sheep upon a farm must be of such sorts as a tenant judges proper, though I do imagine there would be both ewes, lambs, hogs, and weathers, of various sorts*.

Upon a farm of five hundred acres there may be kept one hundred ewes, and their offspring, 'till they be of such age as is proper to feed them at: weathers of two or three sheer are generally made fat, and ewes that the farmers dislike to breed from; in the whole may reasonably be supposed sixty to be sold every year, which is forty less than the number of breeding ewes, though very few of them would fail being with lamb, yet I allow the rest for casualties in the whole flock, and killing for the farmers own use.

After a great mortality in sheep on other farms (in low situations) the ewes would be sold to breed from, to replenish the flocks that were impaired, and even at as great a price as though they were fat, which would be a great advantage to the seller,

* Ewes and lambs are well known; hogs are young sheep, either male or female, and are called so from half a year old, 'till they be clipt the first time, which is at the age of fifteen months; weathers are the males that are castrated, and after the first time of their being clipt are called sheer-hogs; after the second clipping two sheer-sheep, and after the third clipping three sheer, &c.

ler, by saving the turneps that they must otherwise have been fed upon.

The number of sheep I compute to be clipped upon each farm, is two hundred and fifty ; from which there may reasonably be expected five packs of wool ; and admit there was one hundred and eighty farms of the like size in the said county, then the increase of wool would be nine hundred packs in a year ; this additional quantity would be found of great advantage to the nation, and especially immediately after a dearth amongst sheep upon low situations, as it sometimes happens if there be excessive wet summers.

The increase of wool would certainly cause more employment for persons that manufacture it ; but the number that such a quantity would require, I cannot ascertain ; nor am I able to make a calculation of the other advantages that would arise to the nation more than what I have mentioned, by the number of men to till the land ; but I am in hopes some better judge will make these hints more clear.

The converting plowable-warrens into farms of tillage, &c. would be an advantage even to the master-warreners, who would be able to support themselves and families in a more peaceable manner than before, and with less hazard of their lives or health. For the business of a master-warrener requires him to be out of the house in the coldest of nights, else he is liable to be greatly imposed upon, as many of them are indeed, though extremely diligent ; yet it would be more so if they were not upon the warrens in winter nights, for those are the times for killing ; and there are more persons employ themselves that way, than those who have a right to do it ; and it often happens that the master-warreners, when absent, have greatly suffered by their own servants,

vants, as well as those that come from distant habitations.

The practice of rabbit-stealing is become much like that of smuggling, for in some parts of the kingdom such numbers of them have been seen together, that the warreners have thought it too hazardous to attack them, though they were actually taking away their property.

I have mentioned before, the custom of warreners killing any rabbits upon their own ground (without any regard to whose burrow they came from), and, as I have been informed, they sometimes will do it upon a brother-warrener's too, if he does not strictly attend his business of nights. Such a way of life must be not a little disagreeable to every honest man; and such warrener would undoubtedly choose rather to rent a farm of tillage and grazing, whereby he might rest quietly in his bed at proper times, and know his own property, and likewise enjoy more quiet of mind by living peaceably with his neighbours.

I suppose it will be asked how the additional number of people in the kingdom are to be obtained to rent the farms proposed, and labourers to do the work.

I own I do not imagine that the increase of houses and people can all be obtained in one year, for both require time, and the building of houses is the first step necessary to be taken towards executing the plan; if they were increased the people would in course do the like; for there are many persons prevented from marrying by want of habitations, and even of such sorts as are proper tenants for to rent the farms, and likewise others that would gladly become day-labourers.

In many parts of the nation there are farmers sons who are obliged to live in a single state with their parents, though desirous to marry if they could have farms with habitations suitable for increasing

creasing families ; such tenants would as soon be met with as proper houses could be built for their reception.

I have proposed three times as many houses for labourers as there are farms, and have great cause to imagine proper tenants could be met with for them, as there are great numbers of men and maid-servants in the service of farmers that would gladly marry if they could meet with small houses, with as much land to each as would support a cow, or two, and a garden for potatoes, beans, &c. Such tenements as these should be adjoining to the proposed farms.

There are many young persons for want of habitations in the country, who procure settlements in London, or some other cities or great towns ; and in these there are but few children reared ; even not one third so many as there are in the country, from an equal number of men and women ; those born and brought up in villages have also better constitutions than the former, and are the properest for the plough or any other employment that requires great strength ; we may likewise suppose that they make the best soldiers, therefore Gentlemen in all respects do great service to the nation who order such small houses to be erected in the country.

Such habitations would be found extremely convenient, the labourers would then be stationed near their daily employment, which would render them much abler to perform business, than if they had a couple of miles to walk each morning ; as there are many obliged to do, where their houses are in one parish, and their work in another.

The keeping of cows would likewise be of great service to the families of day-labourers ; for milk in the country is the best food that such children come at ; it is not hawked about as in town, therefore poor people are obliged to spend part of their

time seeking for it, and sometimes cannot meet with any; but where a person has a cow of their own the children are fed to their satisfaction, and the mother may earn something at home in the time she must otherwise have spent in seeking milk at distant houses.

I imagine it will be said, that those countries (where warrens most abound) would not produce young men enough of the sort I have mentioned to make day-labourers of; nevertheless enough could be had from other quarters, for in some parts of the nation there are more inhabitants than there is employment for, especially in the north and west parts, many of whom go to seek for business in the south and east parts of the kingdom; such labourers would undoubtedly be glad to rent habitations in those places where they could have constant employment, and the common necessities of life at a small expence: this they could do by keeping of cows, and having lands to grow potatoes, beans, &c. as is proposed to be adjoining to each of the smallest houses.

What I have said, chiefly relates to dry sandy land, which the generality of warrens are upon; but there are large tracts of other kinds of soils which remain perpetual commons, without either rabbits or deer feeding upon them; many of those would produce both good corn and timber, though there is neither upon them at present, nor by the appearance of the surface have they been tilled since the deluge.

I have before explained the different sorts of commons; on some the number of cattle are limited, and on others not, these latter are in general of the least advantage to the proprietors; for many of the richest strive to ingross the product by putting upon them great numbers of cattle, which is a certain disadvantage to their poor neighbours,

hours, and sometimes the same to themselves; for where there are many upon a tract of land, or over-stocked as we call it, they are more liable to die than if there was fewer; and a mortality in them is a great loss to their owners.

Where land has too many sheep upon it, they are not only liable to die soon after a wet summer, but also in dry seasons they neither produce much wool nor become so valuable as others, as being of a much less size; and on many unfenced commons, both young horses and horned cattle meet the same fate of being starved, so that they are but of little value; neither do cows or full grown horses, bred on such commons, yield much profit to their owners; for the former give but little milk, and the latter are unable to perform much business, or if mares that suckle foals, their offspring is generally small.

In winters attended with continual frost, where the land is deeply covered with snow, there generally are great numbers of cattle starved to death for want of fodder; for many who have much cattle upon commons possess but little land as private property, therefore cannot support them, neither are they sold for much when there is a great scarcity of hay.

In parishes which have large commons belonging to them, the number of poor generally increases by hard winters; for many small tenants sink their substance in sheep, or other cattle, and when they die they have lost their all; of such men who meet with those misfortunes, there are but few who take to hard labour after, as having before been only accustomed to watch their sheep, &c. which is not hard work, therefore they cannot support their families after, but become an expence to the parish; and it is a general observation in the country, that the poor's rates are highest where the largest commons are.

The lands I mentioned might certainly be better employed ; but I do not wish to have any of the least proprietors deprived of keeping cows, or any other stock that they have, for I think that every one ought to have their proportionable share of land allowed them, which would be more advantageous to every one than their mixt property in the whole.

Where lands are inclosed then each possessor has it in his power to make use of it as he thinks proper ; and many of them would undoubtedly get both hay and corn, by which they would have fodder for their cattle in winter, and bread for their families.

There are other very old commons (if not covered with water) would produce grain of some kind or other, and by proper tilling the land might be made better for pasturage after, or for the production of fodder.

Or if the possessors did not chuse to plow, they might make many other improvements after inclosing, that are not done upon commons, and likewise keep such stock as they liked, and would also have it in their power to get fodder for their support in winter, with hedges for shelter, as is not upon many commons ; though perhaps some persons could not keep so much cattle in summer as they did before, yet if they were better in quality, the value would be greater than a larger number of starved ones that lived upon the product of the common only, where it is too full of cattle.

The inclosing of every sort of common would not promote so great an increase of people, in proportion to the quantity of land, as those that have warrens upon them ; though were large tracts of land to be made dry, that are now under water, there would be employment, and common necessities

cessaries for many more than there now is; and were dry commons to be inclosed, then in all probability there would be more corn growed in those lordships, which would require people to carry on the business of plowing, mowing, reaping, thrashing, and many other works of husbandry; mechanicks would likewise be wanted to make and repair all kinds of utensils that such business requires; and by improving the land, the production of wool would be much greater than before, which would make employment for people in various parts of the nation; the corn that would be sold for malting, would in some measure create work, though not so much as the last mentioned article; and if the increase of people was but small in some parishes, after the inclosing of commons, yet in the whole nation it would make a considerable addition, both of men and corn; and undoubtedly there would be plantations made by many of the land owners.

Commons are of various sorts of land, therefore I cannot make an exact estimate, either of the expence or profits that would arise by the improvement; yet I have some reason to believe that the work would cost less, and the advantages be greater than those arising from lands that were warrens, only (admit their qualities were equal), for which I have made a calculation before.

Where there are no rabbits, or they are only part of the stock, there will be fewer additional houses required than on such lands as are warrens only; the expence will consequently be less in making the improvement; and as to the inclosing, it cannot be much different from the former, admit the soil be the same, and the plots of equal sizes with the former; though if they were much less, and the expence more, they would be the readiest let,

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and for a greater price, in proportion to their quantities; as being sheltered by the hedges they are better for cattle, and the properest for small tenants, of whom there is the greatest number; and they generally give the best price for such quantities of land as their abilities can stock.

These kinds of commons are not in much esteem by the proprietors, for I have heard several of them say, their being stocked in an irregular manner rendered them of little use: neither do they bear much rent, for the other parts of farms they belong to would be let for nearly as much alone as the whole are now; these are my reasons for thinking that the advantages by inclosing, would be greater here than on lands that are one shilling an acre, as those warrens are that I made the first calculation for.

There are other lands, if they were inclosed, would add more to the nations advantage than those I have mentioned; I mean some parts of the common fens, and others that are private properties; such as are uninhabitable, by being six months covered with water, and sometimes for years in the same state, and of little use.

There have been some lands of the same sort laid dry by engines, imbankations, &c. and by other methods of industry have afterwards become as fertile as almost any in the nation (and none properer for raising oaks). The number of inhabitants are likewise increased greatly, even more than three persons to each hundred acres of land: this I had before accounted to be the additional number the warren-lands would employ, were they to be cultivated.

In some parts of the nation, by general draining, the roads might be greatly improved, and their lengths contracted; old navigations might be made better, and new ones obtained; these

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improvements tend much to the publick good, not only to travellers but to trade; for all kinds of traffick might be more easily conveyed from one part of the kingdom to another: it would also contribute much to the health of the inhabitants, for the fens at present, are stagnant lakes, from which large fogs arise that have a disagreeable smell, and unwholsome to those that imbibe any part of them.

Improvements of this kind, by separate drainings and imbankations, have been found of great advantage to the land-owners; but they might be much more so, if all the proprietors of such lands were unanimous where the estates joined each other; then the work would be done at a less expence, especially where a general draining might be obtained without the charge of erecting and supporting of engines; and not only that, but the other work likewise would cost less than the banking round of every lordship, or smaller tracks of land separately.

When attempts have been made for inclosing of commons, or to join at a draining, such schemes have often been opposed by some or other of the proprietors; even when it has plainly appeared to reasonable persons, that all would be gainers by it, though perhaps all would not receive advantages alike, nor in proportion for their part of money sunk in the work; for it is impossible to form a plan so perfect; neither can the most equitable propositions imaginable please every one.

The inclosing of commons are often prevented by unreasonable claims made among the proprietors; for some will pretend that every one has an equal right; and the little freeholders, or land-owners, demand an equal share with the greatest, or else they will not consent to a division.

It must be owned that every one who has a right to a common, may put upon it what stock they

they please, of the kinds it is adapted for, admit they be their own property; but that does not imply that all do receive advantages equal; they surely who have the most inclosed lands (or others that are private) have it in their power to make the greatest benefit of the commons; for, as I before mentioned, in some winters, the cattle upon commons cannot live without fodder.

It is a custom with the greatest stock-masters to put large numbers of horses and other cattle upon commons in summer and autumn; by this means they have an opportunity of saving much fodder in their private grounds, for their cattle in winter; this practice greatly distresses those that have but little private ground; as there are many have not, but make their greatest dependance upon the commons.

This may by some be deemed a piece of barbarity, thinking that the rich are robbing the poor; but as they pay the most to the church and poor-rates, it must be reasonable that they should have the greatest benefit of the commons; and if the commons were to be inclosed, those who are the highest charged in the parish books, have some reason to expect a share of land in proportion; and the smallest contributors ought to have their dividend by the same rule.

There are many commons which are stocked by a limited number of cattle, and not too many for the quantity of land; yet they might be made more advantageous than what they are; for as they have not been plowed of a great number of years, those that are of clay-soil the surface is become of so solid a body, that grass does not prosper so well as though it was rendered more open by proper plowing. These lands would produce much better crops of corn than old tilled land; and the latter would produce better grass if their feed

seed were sowed with the last crop of corn before laying down.

Sand-lands for want of plowing, generally produce much moss, and that is destructive to the best sorts of grass; but they are capable of being improved by the same rules as the former, and would by tilling produce crops as profitable.

Where stinted pastures are in such open lordships that are the greatest part of them tillage, there might be as many cattle kept as before, where all the proprietors are condescending to a thing that tends to a general good; for if an equal quantity of old tillage was sowed with such grass-seeds as are suitable to the soil, they would make a better pasture the first year after laying down, than the old one was, that had not been plowed of some ages.

There are likewise many tracts of lands annually mowed, without ever been grazed a whole year; these are much less profitable than they might be made, for by pulverizing the soil, they would produce good crops of corn, and by laying down judiciously, would be more valuable for hay than they were before plowing.

I have known improvements of these kinds, made in some few open lordships; but in many others, designs of the like nature have been obstructed by a small number of the proprietors not consenting; and even sometimes by only one person that would not comply. I own that the advantages which might arise from the plowing of one small common, would be but little to the nation in general, though many of such improvements would be perceptible; and there would certainly be a great number, if they could be done without the expence of an act of parliament for each separate common, or meadow; but as works of this nature tend to a publick good,
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I hope something will be thought of by the Legislature, to enable persons to execute designs which would be so beneficial to the nation.

The great advantages which might be obtained by drainings, inclosing of large commons, converting of warrens into farms, or improving of any other barren lands, are well known to many of the proprietors, who though well-wishers to the publick good, yet have undeniable reasons for not entering upon such works; some only enjoy their estate during the life of their wife (being the jointure made by a former husband), and at her death it returns to another family, not related to the immediate possessor; and most men refuse to sink money upon such titles, deeming it a robbery of their heirs. There are other estates which descend from the father to his eldest son; where there is a number of children in the same family who have no share in the estate depending, the improvement of it would make odds in their fortunes, by sinking money upon those lands which must become the property of one child only. There are other estates which belong to minors, whose trustees have no authority to join in drainings, or to enter upon any other expensive improvement; these restraints greatly hinder many useful improvements which might be made in the nation: and was every possessor of such lands enabled to mortgage them, for the money the work would cost, there would in a few years be a visible increase of people, corn, wool, and plantations, which would be timber in future ages.

Were estates to be mortgaged, and the annual profits greater after, than before, then there could not be any just cause for succeeding heirs to blame the former proprietors: before the mortgaging of such lands, there ought to be proper security given, that the money should be applied
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to their improvement ; and the method proposed for doing it ought to be deemed a reasonable one, by proper persons appointed to make enquiry.

There are old inclosures which might be improved to the advantage of both landlords and tenants, and would likewise add to the wealth of the nation, by the corn they would produce if properly tilled ; and after that would be better pasturage for all kinds of cattle than before.

I have already mentioned the benefits of killing moss, and pulverizing of clay ; but there are yet other advantages might be obtained in many inclosures, and that is, by laying their surfaces in a better position than they are at present.

There are some lands, which by their appearance have never been plowed ; such of them as are quite flat, the water occasioned by rain or snow, resides either upon the top, or near it in winter, which renders the soil too cold for sheep or other cattle to live there ; likewise, the grass they produce in summer is not of so good a sort as if the water was discharged from them quicker, which might be done by plowing the land into narrow ridges.

There are others that have been plowed in past ages, and are now in ridges, though too large ; for on clay-soils the water stands betwixt each of them, as the furrows are lower than the ditches that ought to receive it ; and some old lands have many large ant-hills that produce but very bad kinds of grass, and prevent the mowing of the other that grows near them. In such cases, and many others, it is possible to make improvements by plowing ; and likewise on dry lands of any kind, when the water runs off too early, as it generally does upon such soils where the ridges are raised too high.

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These things are well known to many tenants who would gladly alter them, could they have the consent of their landlords; but this is often denied, because some lands have been rendered worse than before, by plowing too often, and being sowed with corn, without manuring or fallowing; this is often the case when lands are let at too high a rent, or not upon lease, for then such tenants make as much profit as they can in a few years, and then give up their farms to the landlords who are then obliged either to lower the rents very considerably, or keep the land untenanted to their great disadvantage. Examples of this sort cause many gentlemen to deny their tenants the liberty of plowing any inclosure, at least but a very small part; I have known this resolution to prove of ill consequence to several landlords, for the tenants not being able to pay their rents, have actually been obliged to quit their farms (and some of them have become chargeable to the parish), then the landlords have occupied them 'till tired with loss; after they have granted new tenants leave to plow a reasonable part; and now they have their usual rents well paid, and the people live in a reputable manner; and I know some do the like upon advanced rents, when the hold their farms by lease; for when a person is certain of his possession for a number of years, he takes pleasure to improve it.

Improvements are seldom seen where the tenant distrusts the honour of his landlord, and has not a lease of his farm; for when improvements have been made, and those who made them not allowed to enjoy them, this has deterred others from the like, therefore leases are of general use; for a tenant thereby may be empowered to cultivate his farm, by which he will be more able (than before) to pay his rents: and the leases
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may be made so much in favour of the landlord, as to prevent their estates being injured by too much plowing; and undoubtedly the nation will be improved by an additional number of people. For when the quantity of tillage increases, the number of labourers does also in proportion; I know some villages wherein there have been houses built for the reception of day-labourers, to promote their increase. These things were done, where the greatest part of the lordships had been grafs for many years (being old inclosures), but now there is more of them tilled.

I know there are many gentlemen who have a notion, that inclosing of lands greatly lessens the number of people; but it is not that alone that does it, for in country places (where there is not any kind of manufactory carried on) the number of people are in a proportion to the quantity of land tilled, be it either open fields, or inclosed; for I have known where the number of inhabitants greatly increased after inclosing, and likewise where they decreased in villages, though their fields remained open.

I will shew the cause of both, and the good effect that attends the one, and the ill consequences that the other is liable to. One of the villages that I know where the people increased after inclosing, is upon an estate that was improved by a worthy gentleman who is now dead. The lordship contains more than three thousand nine hundred acres of land, and there was but very little inclosure in the whole; it is of various sorts, and part of it very good, even before the late improvement. The whole lordship, about thirty years since, was let for only three hundred and thirty pounds a year to two tenants, who both broke, and the gentleman was a great loser by them. This gave the estate such an ill character, that it could not be let; and indeed there are

but few tenants able to provide stock for such large quantities of land; this caused the gentleman to buy stock, and direct the management of the land himself, though he was unacquainted with the business before this happened; but being a person of great acuteness, he by strict application obtained an excellent knowledge in agriculture, and soon discovered the disadvantages that attended his estate. One amongst the rest was, the want of more and better hedges, to divide the land into smaller plots, and to preserve the corn, or turneps, from the cattle; for the custom hitherto had been, to have all kinds of stock to graze in one piece of land, which was very extensive, with bad fences on the boundaries, through which the cattle easily passed, and especially the rabbits that were amongst them; but these he banished from many parts of the lordship, and only suffered them to remain upon a small part of it, for a few years. The parts adapted for tillage he caused to be well plowed, and soon began to divide the land into less parts, by setting of quick, and fences to guard it. But there being then but few labourers living in the village, he was obliged to hire men from distant parts to do his work, as well as horses and plowmen, for he endeavoured to have all his work done in the best manner, and at proper seasons: by such methods he acquired good crops of corn, turneps, and rape; by this kind of management, and by laying down with proper grass-seeds, the estate came into good repute in a few years, and he was solicited to let parts of it for farms, to which he consented, as soon as he could get houses built for such tenants, and the labourers they required.

The estate is now let for near a thousand pounds a year (exclusive of some plantations), and the tenants pay their rents well, notwithstanding

standing some of them bought part of their first stock on trust of their landlord ; but this is paid, and every one now lives in a plentiful manner ; their welfare was a pleasure to the gentleman (when alive), and it is now the same to his children, who are desirous to make improvements, and see their tenants prosper.

I am not certain of the private advantages from the improvement, but have heard that it paid much more than common interest ; however, since the inclosing there are more than tripple the number of inhabitants. There are villages in the same county too, wherein there are much fewer inhabitants than I have known, notwithstanding the fields are not inclosed. A few years since they were rented by many small farmers, who made plowing the greatest part of their employment ; by that they got crops of corn, &c. to support their families, and pay rents, &c. but now most of the houses are down, and each lordship is let to one person only ; and such large tenants very rarely plow so great a quantity in proportion to their rents, as the lesser ones do, who make their greatest dependance upon their tillage ; and it is the same in other places where farms are large, and but little of them plowed, for there the inhabitants are the fewest.

I have heard two reasons assigned for reducing the number of houses ; one is to lessen the expence of repairs, and the other to prevent there being too great a number of poor ; but such designs have not always the desired effect ; sometimes a great tenant fails, and the landlord loses by him, or if he be tired of the farm gives it up ; then the landlord, perhaps, cannot meet with another to take the whole, but must either keep it, or else divide it into less parcels, and build houses accordingly ; in any of these cases, if labourers are required, it will be an extraordinary expence

if they come from distant places, even though it be but two or three miles ; for a man that walks so far every morning and evening, cannot be expected to do as much work as if he lived near it ; yet he expects a greater price for what he undertakes by the lump ; and if the habitations of the labourers be at a greater distance, they will ask still the more, for a poor man cannot live so cheap from home as with his family, therefore he will not go far to work without extraordinary wages. There is another inconvenience which attends the farmer who has his labourers too seek in distant parishes, he cannot always have them when he wants them ; this is a loss, and many times a great one, if it happens in harvest ; whereas, if his labourers have habitations in the neighbourhood, they are ready at the master's call, and if more than common earliness be required, they may be easily acquainted with it ; therefore houses in every lordship, for as many labourers as can be constantly employed, may be deemed necessary, though I must allow, this may be the cause of some poor, yet the expence of them to the farmers cannot possibly be more than the money saved by having their workmen live near them.

The work is certainly cheapest done where the greatest number of labouring-families reside, and it is evident that the useful ones contribute to the support of others not capable of maintaining themselves.

I doubt not but it will be remarked by some of my readers, that in many parishes there are more labourers, than there is constant employment for ; in some places I know it is so ; but the case is the reverse throughout the nation in general ; for in many parts the want of men to till the land, causes many large tracts to remain almost useless, which otherwise might be improved so much as to produce both timber, corn, and wool, with many other

ther valuable commodities; therefore the want of small habitations in the country is a loss to the nation, and he that builds them (where wanted) does a public good; but was every gentleman (that has it in his power) to lessen the number, the nation would become distressed for want of corn, and there would be fewer young men to repel our enemies in case of danger.

PART the Second,

Shewing the various methods of dividing and inclosing barren lands, and how to make fences (to guard the young hedges), at an expence not half so much as the common methods are. A method also of preparing barren soil before the planting of young hedges, by which they will grow as luxuriantly as on soils that are naturally the most fertile.

SURVEYING is the first thing necessary towards dividing or inclosing of large tracts of land; observations should be made of the hills and valleys, and the springs, or where there are any signs of water being easily obtained, all which should be laid down in the map *: by this means, the plots intended may be laid out in such manner, that all of them shall have the advantage of water; and where there is a necessity of sinking of wells, it may be done so that one of them shall serve four fields, by having a large cistern placed in each of them; admit the well be made at a point where the fields join.

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* Where there are rushes, or wild mint growing, there generally is water near the surface.

The next thing necessary to be thought of, is the fences to divide the lands, and how to guard the growing hedges after planting, that they shall not be injured by any kind of cattle; this is the greatest expence that attends inclosing, and it ought to be considered what materials, for that purpose, are easiest to come at, for the cheapest will undoubtedly be most agreeable.

I shall here mention various methods that I have observed, with the expence attending them, and likewise give my opinion of the effect of each; but the expence of work being double in some parts of the nation to what it is in others, the charge of inclosing is therefore various; and this not only by the price of the labour, but by the prime cost of the materials, and the carriage of them.

Where stones are easy to be come at, I have known dry walls made of them; and if they be four feet and a half high, are a proper fence against horses, horned cattle, hogs, or sheep; and when properly built, will stand with very little repairs 'till the hedges (if well planted) be a fence; and then the stone, if it be of a right sort, may be burnt for lime to improve the land with.

The cheapest that I have known this sort of work done for, is eight-pence a yard in length, taking up the stones in the quarry, and building the wall; but the expence of carriage is according to the distance, and cannot be accounted for in all places, though this work is seldom done where stones are at a great distance.

Upon good land, to prevent much of it being wasted, I have known posts and rails, the guard fencing with a small ditch, and where there are three rails to each post, the expence is nearly equal with the former.

Sometimes large ditches are made, and a high bank raised, at the top of which the quick is planted,

ed, and in the side of the bank are slight fleaks drove in, somewhat leaning over the ditch; this sort of fencing, with some little repairs, I have observed to answer the purpose it was intended for, and is cheaper than either of the former; for where there is not a rock near the surface, a ditch of four feet wide in the top, and two feet deep, may be made for three farthings a yard in length; and hurdles made of hazles or fleaks, with three flats to each, will come to little more than three-pence a yard, which makes the whole expence of each yard about four-pence.

In low and level situations, ditches are made eight feet wide in the top, four feet in the bottom, and two feet deep; this work costs two-pence a yard in length in some countries, where the land is easy to dig; these ditches generally have water in them, and are fences alone, without any quick growing upon their banks; but I think hedges are more shelter to cattle, and likewise to the young grass in spring, when there generally are cold winds and frosts in the night, which are greatly prejudicial.

Where lands bear but small rent (as the generality of warrens do), there are walls made of the soil, which will stand nine or ten years, with some small repairs, that are not very expensive, there being nothing to be purchased but workmanship; they are generally raised five feet high, and the expence of the work is not more than three half-pence for each yard in length; and if a small ditch is made by the sides, to secure them from horned cattle, that may be done for a half-penny, then the whole expence is but two-pence a yard; this sort of fencing is the cheapest, but it cannot be made where the land is tilled, or covered with furze or ling, for the turf is required to hold the earth together. As sod-walls are only known in some parts of the nation, I will describe their shapes and

the manner of building them. The height of the walls I have mentioned before, and the breadth in the bottom is generally made two feet and a half, and at the top below the coping, about twenty inches broad; each side ought to batter equally alike.

At the place where the wall is to be built, the workmen extend a line by the side of it, and make a cut directly downwards with their spade, as deep as the soil or staple of land will admit of; they then do the like, parallel to the first, at the distance of two feet and a half; and after the two lines are done, betwixt them cuts are made of the like depth, at right angles, from one line to the other, and about eight or nine inches apart, and the whole sod is taken up with the spade as deep as the earth will adhere together, and then laid with the grass downwards, with one of their ends to the other side of the first line that was made, and their whole length is the breadth of the wall at bottom; after this first course of the wall is laid, the end of the sods are pared with a sharp spade, in such manner as to cause them to form a straight line, and to batter equally on each side so much as to bring the wall at the top to the breadth before-mentioned.

The sods of the size I mentioned, in some soils, are liable to break, or being too heavy for a man to lift with pleasure, it is necessary to cut them in two before they are turned over, though they must be joined together as one sod, in the place where they are laid for the wall; but it is judged by the workmen to be better to cut them obliquely, than square as the end of a brick is: after the laying of each course of sods, the upper part of them must be made even before another covering is laid on; and as broad as the top of the work is, the line must be set for to take up the next sods by, though they may

may be cut in two before laying, for reasons given before.

In carrying on the work it must always be observed, that the joints are not directly over each other, for every one ought to be covered with whole fods, in the same manner as a wall is made of bricks or stones; and the two courses next the coping, ought not to be cut in two as the former, but should be laid on their whole length, directly across the wall, to bind the others tight to each other; and after that a coping-fod must be laid on with the grass uppermost, and project on each side about three inches; and if at any time the coping happens to be broke it ought to be immediately repaired, or otherwise the wet will greatly impair the wall, especially if the soil be clay or strong loam.

If turf is not to be got at the place where the wall is intended, it may be brought from distant places, and even then at a smaller expence than stone.

The taking of fods to build walls will greatly impoverish the soil and render the surface (from whence it was taken) very poor; but it will recover, and become as good as any part of the fields in two or three years; for by plowing and harrowing, soil will be brought there; and the cattle, for sake of shelter, will choose to lie near the walls, and their dung will be of great service.

I have before observed, that the hills and valleys should be shewn in the draught, for the advantage of dividing the fields, so that every one may be served with water; and that the hills and plantations may be laid in such manner, as to make the inclosure more ornamental than the open field was; and if each tenant's house be near the centre of their farm, they will be more convenient, than if all the houses stood near each other, as they do in villages.

When

When the walls want repairs it is probable the fields adjoining may be tilled, and cannot afford turf for the purpose, therefore it will be necessary to leave three feet in breadth betwixt the wall and the land that is to be prepared for the hedges; and if there be two walls, as it is requisite there should, the like must be by each of them; and the distance from one to the other ought not to be less than sixteen feet; ten of it to be prepared for planting, and ditch; for was it to be less, the roots of couch and pry, would be apt to run from the old land, and mix with the roots of the hedge, and be very prejudicial.

The turf used to build the walls with, must not be taken from the place where the quick is to be planted, for that would render it impracticable to improve the soil by burning.

To render the method of building walls, and planting hedges more intelligible, I have given a sketch of it.

A A A A The ditches on the outside of the walls to preserve them from horned cattle, they are to be the least breadth in the bottom imaginable.

B B The ends of the sod-walls.

C C The tops of ditto.

D D The land left untilled for repair of the walls.

E E A slope from the top of the bank.

F F The top of the bank.

G G The side of that bank wherein three rows of plants are set at a foot apart.

H H A ditch of four feet broad, and two deep, out of which earth is taken to raise the bank.

I I The first course of fods as they are cut to build the wall with.

K The front of a sod-wall, with the manner of the joints.

L M N Land restbalk't.

If

If hedges of white-thorn, horn-beam, maple, or the like, be planted upon land naturally barren, they will thrive but slowly; and that causes a great expence by weeding, and likewise in repairing the guard-fences for a long time before they become fences.

But if such land be properly cultivated before planting, the weeding will be over in two or three years, and the hedges able to defend themselves before the walls need much repairing.

Whilst the land is preparing before planting, it requires a whole summer to do it in, which causes some gentlemen to omit it, not chusing to lose a year; but that need not be always the case, for as Lady-day is the most customary time that tenants quit their lands, if the landlord then enters upon them, with an intent to inclose or divide, there is then a summer to come before planting can be done; and the land may be prepared while the guard-fences are making.

When plans are laid down for the dividing of lands, the soil may be improved either before or after the building of the walls; admit they be placed at proper distances, and the turf left betwixt them.

On lands covered with ling, furze, or old grass, sufficient improvements may be made by burning, and proper tilling; and if they are pared with a breast-plough, it will have an excellent effect, for then there will be more earth burnt than if the land was broke up with a horse-plough, and fires made on what the harrows will take out, as the roots and branches of ling, young furze, or grass.

The land that cannot be pared with a breast-plough is such as is mixed with pebbles, or other stones near the surface; for either of them injures the

the instrument, which ought to be kept extremely sharp.

To improve such land it should be plowed in April or May, as thin as is possible to do it ; and in such manner as to lay one part of the surface, or grass, upon the other ; that is, by turning one half only, and the other to remain uncut, as the spaces L : M in the plate ; N is the part plowed, and turned into two furrows, the one towards L and the other to M, so as to join each other : by this the earth soon becomes dry, and the roots are easily taken out by harrowing, after plowing. This method in some countries, is called rest-balking ; and though only half of the land be turned over, yet the roots of grass, and weeds are much sooner killed than if all the land was plowed deep, as is practised by some people, who imagine that such plowing soonest destroys the roots of couch, or the like : this, however, is a mistake ; for by turning up much earth with them they keep moist and growing, except the land was trench-plowed eighteen inches deep, but that is very expensive, and in some soils cannot be performed, where there is a rock near the surface or congealed pebbles. In the space of twenty or thirty days after rest-balking the land, the greatest part of the grass will be killed ; then it should be plowed, and likewise harrowed, two or three days afterwards, or any time earlier, if there be a probability of some of the roots being separated from the earth ; this work must be done every day in dry weather, 'till most of the roots be drawn out of the soil, and when they appear so dry as to burn, let them be laid in heaps, at four or five yards apart, and fire put to them in the evening ; for in the open air they will burn best in nights, and should then be attended, to keep the fire in till the whole be burnt : when the heaps are cool let them be spread all over the
land

land that was plowed, not leaving any ashes in places where the fires were. Ten or twelve days after the last time of harrowing, the land must be plowed again, then harrowed, and as much roots and other things as the harrows draw out, must be burnt and spread as before ; this must be repeated three or four times before the end of August, in dry weather if possible. I should recommend the plowing of it slanting, the second time, if it could be done, as the lines upon the plan, betwixt O and LMN represent, and observe to go not any deeper by plowing than it was at first taken up, 'till the roots of couch, and other weeds be killed ; and when that is done, the deeper it is plowed the better, for that will increase the quantity of soil.

The slant, or angle-plowing, may be very well done before the walls are built, but after there is scarcely room to turn a team of three horses ; but where the ploughman only uses two horses on a breast, and guides them by reins, then he will find room to turn, admit the walls are built.

This method is much the best, for it cuts the fods in long narrow pieces, that are easily broke by the harrows : and much sooner becomes dry than if they were plowed, either in length, or directly across, the second time ; for by the one there would be fods of a great length, and the whole breadth of the furrow ; and the other method of plowing would leave square pieces that would not soon be pulverized by the harrows.

I have recommended the summer-months to plow and harrow the land in for the following reasons : viz. by exposing then the roots of perennial weeds to the sun and dry air, they will become dead, and many plants be killed that might possibly arise from seed, betwixt each time

of

of plowing and harrowing; especially if there had been furze or broom growing there before, for they generally shed large quantities of seed which never perish before it grows; and when plants of either are suffered to live amongst thorns, or any other young hedges, they weaken them very much: there are many annual weeds that would be killed by plowing in summer.

But the like number of times plowing and harrowing, late in the autumn, in the winter or early in the spring, would not have the same effect of killing weeds; for the seeds before mentioned would not become plants betwixt each time of plowing, but remain as perfect as before, and be liable to grow in the ensuing summer.

As to the roots of any kind of perennial weeds, there would not any more of them be destroyed than what the harrows might possibly take quite out of the ground; for if part of a root be in the earth, it will remain alive, and grow the next spring; for that reason the cutting of roots by plowing in winter increases the number of weeds, for the frosts will not kill them that are in the earth, though some people may imagine it would.

If hedges be intended where the lands are tilled, and have for some years been sowed with corn, then plowing and harrowing in the summer is as necessary as though it was grass; and as there cannot be so much matter to burn as before, there ought to be some proper manures laid upon the land after the second time of plowing; and by the next it will be mixed with the soil. If it be sand, gravel, or creach, I would recommend a thin covering of clay (if any is to be met with near); this will prevent the wet from descending too early from the roots; and after the last time of plowing, I recommend a thin covering of

of any of the following ingredients, viz. pigeon's dung, lime in the stone, about twenty bushels to each acre of land, decayed wood, saw-dust, or foot, double the quantity; but if none of these can be had, or perhaps at too dear a rate, then the land ought to be extremely well tilled in April, May, and June, and sowed with turneps, and to be grazed with sheep, whose excrements will make an improvement equal to the manures beforementioned: I mean to have the whole field tilled, for one part cannot conveniently be done without the other; and the earlier the crop is eat off the land, the properer will the season be for planting; if it could be done in November and December, it would be the best, as January and February are often attended with frost: and it is not safe to plant white-thorns, maples, or horn-beam, later than the middle of March.

This method of preparing land may be thought tedious and too expensive; but I have raised good hedges by it in ten years, upon lands where hedges had been planted by the common method, twenty years before, and never became a fence.

After the land is prepared, the next thing is to provide plants, and if they be either white-thorn, maple, or horn-beam, I should chuse to have them as thick as a man's finger, whether taken out of woods or nurseries; and in the taking of them up, as little of the roots should be cut off as possible, and kept from the air, which would dry and kill the small ones that ought to be preserved, for they are the first that make new fibres.

When the side of the ditch is marked out next to the place where the bank is to be raised, then cut the plants about six inches from the roots, and if any of them be broke, cut the end smooth with a sharp knife, but do not meddle with any other

other part ; when that is done, lay them a foot apart, with their upper ends even with the side of the ditch : then cover them with earth about eight or nine inches thick, make the top even, and the front battering, as the side of the ditch does below ; that is to cause both sides to meet in the bottom when it is two feet deep ; the second and third rows must be laid at the like distances from each other as the first, and opposite the middle of the spaces as in the plan.

I have not mentioned planting of oak, ash, or elm in the hedges : for any of them do hurt, and the roots of the two latter run so near the surface as to prevent plowing.

I have some reason to imagine, that planting on a side of the bank will be thought improper, for I have heard it said the plants stand too dry ; but by experience I know the contrary, for though their tops are at the side of the bank, their roots are not, but are placed in such a manner as they meet with moisture and good earth, below where they descend into ; I have seen them prosper well by this method, and much better than some near them, that were planted in a trench prepared for the purpose, about a foot deep and filled with good earth, nearly, though not quite so high as the natural surface, without any kind of ditch by the side, and by that it was imagined the plants would receive more moisture : below the made-earth there was only small stones mixed with a little sand, and when the roots reached there, the plants did not thrive.

In making of a ditch two feet deep (as I have before proposed) poor earth, or stones at the bottom, will become the covering of the last or uppermost row of the plants, which will prevent their prospering at first, but their roots in a little time will reach the better earth, and the plants grow as vigorously as the other, which is the
advantage

advantage of planting high, there being a greater depth of good earth for the roots to feed in.

The first and second year after planting, the quick must be kept clean from weeds, for notwithstanding the land had been tilled before, yet it is possible there may some come from seeds, and roots unkill'd, though much fewer than if it had not. Upon dry sand-lands the hedges are often injured in April and May, by a hairy kind of Caterpillar that eats the leaves, and young branches; this may be prevented by observing in winter where their cells are, that contain their eggs; they appear like cobwebs fixed to the branches: the best method that I know to destroy them, is to cut the branches off that they are upon, and burn them; this is not a great expence, for a man will clean many rods in a day, and put them into a bag tied before him, 'till he has got as many as will make a small faggot; but it is not safe to let them remain near the hedges, lest their eggs should kindle, and the Caterpillars travel to the hedges to feed.

It may reasonably be expected that the hedges will be grown to six feet high, in four or five years time, and then they should be plasht, or laid, as some call it; the method I approve, is to cut up close by the ground every other plant in the upper row, leaving the strongest standing, but cut them about three feet high. Those of the other two rows should have their tops taken off, at about four feet from the ground, and at the bottom cut more than half through: it will not only render them easy to lay, but the part below will put out a greater number of branches, than if it had not been cut; the branch of the first and second rows must be laid between those of the upper one, and so much slanting on the side of the bank, that their ends will reach about six inches

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further

further than the line of the upper row; those that are laid must be at equal distances from or above each other, and in such manner as the upper one shall be near the top of the upper row, that was cut at the height of three feet from the ground; by laying them obliquely on the side of the bank, they prevent sheep creeping between, and make very thick hedges, for they put out branches from the layers, and also from the parts below the cuts.

At the time the work is doing, the weeds or grass that may possibly grow upon the bank, should be cut up, and the bottom of the ditch cleaned out, and spread upon the land, and not laid to the roots of the hedge, for where that is done, it greatly encourages weeds and briars: paring the sides of the banks has a contrary effect, for it destroys the weeds, and increases the number of shoots in the hedge; for where there is a root laid bare in the side of the bank, it will put forth branches, either the white-thorn, maple, or horn-beam; the best hedges I ever observed, were managed this way.

The plashing or laying of hedges should be done in the winter, when there is not any leaves upon the thorns or maples: for at other seasons the wind would part from the wood, and the upper parts would die.

The guard-fences should be kept up for two years after the hedges are plasht, for were cattle to come at them the first or second years, they would do as much hurt as though they were new planted.

There will be some difficulty of meeting with a large quantity of white-thorn plants, of the size I mentioned, except a gentleman has them upon his own estate, for nursery-men chuse to dispose of them small.

To

To such persons as propose to divide their lands and to plant many hedges, it will be extremely convenient to have plants for their use, growing upon the same estate: for then they may be kept to a proper size, and there will be less hazard in planting them, than if they were brought from distant places; and the expence of keeping small plants clean from weeds in a nursery, will be much less, than if growing in the fields to make hedges; but when they are planted large for that purpose, the expence of weeding would soon be at an end, and likewise that of guard-fences, which is the greatest expence that attends inclosing.

I don't propose at present to treat largely upon a nursery, but only to mention the management of a few plants proper for field-hedges, which might be bought small ones, of nursery-men, and after brought to the size I proposed they ought to be, before they were planted in the fields.

The land for this purpose ought to be such, as may be trenched eighteen inches deep, either with the spade or plough, without meeting with a rock, much pebble, or strong clay; for the plants will make much better roots in soil that is tenderer; such as black sand, or any sort of mixed earth that is not too stiff and binding.

The plow-trenching is much the cheapest, yet I don't recommend it before spade-work, for I could never see it so well done: as the surface sometimes is drove in heaps by the first plowing, then the next does not cover it equally, and if there be any roots of couch near the top, it will greatly increase, and the expence of weeding will be great, or it will otherwise much injure the plants. But when it is done with the spade, the couch may be covered a foot thick with earth,

admit the whole depth be but eighteen inches ; and that is a sure method of killing it.

The trenching should be done in the autumn, that the land may be planted in the mildest seasons, for frosty air is not good to expose the roots of plants to : it kills many fibres that might be of service ; for plants which are very small, March is a proper time to plant them, lest the frost should heave them out of the earth, but I should chuse to have them remain in the seed-bed, till they were a foot in height, then they would be in less danger.

The plants that I propose for planting upon dry lands are the white-thorn, maple, or horn-beam, with some hollies, and the like management will serve them all.

When the ground in the nursery is prepared, I should not chuse to have the plants put in with a dibble, for I have observed this to cause many roots to grow crooked, and to break when taken up the next time. Before planting, their roots should be cut to about ten inches long, and laid slanting in drills made with spades, and after the earth is laid upon them, a person should go with one foot on that side where the roots lie, and tread the earth fast to them, and at the same time cut off their tops about an inch above the ground ; the drills may be about nine or ten inches apart, (then a hough may be readily used to clean the land) but the plants need not be more than four inches from each other, and to remain till they be the size of a man's finger.

On lands that are tilled it is impossible to make walls of fods, therefore other guard-fences must be made use of : but if the fields on both sides a new-planted hedge, have not any sort of cattle in them the first summer after planting, then in that time not any are required, and if in the winter there be only sheep, one row of fleaks,

or

or hurdles placed upon the top of the bank, will be sufficient to prevent sheep passing through the hedges: it is possible they may crop part of them, but they will not much chuse it, as the branches will then be hard, and the tops higher than they can reach; but were the sheep to have the like opportunity in summer, they would prevent any shoots being long, by eating them at their first appearance.

If horses or horned cattle were to be in the fields, one row of fleaks or hurdles would not be sufficient on that side where there is not a ditch, to prevent their pressing against them; and was there to be one made on the other side, as from D to D in the plate, the bank ought to be made extremely narrow in the top: otherwise the cattle would walk upon and destroy it; and such a bank with a ditch on each side would take off the moisture too fast from the plants: therefore I should rather chuse to have but one ditch, and from D to D place a row of posts somewhat leaning from the plants, at three or four feet distance: and in each of them a rail high enough to prevent the large cattle getting over, but not so as they shall have an opportunity to creep under; the fleaks at the top of the bank will stop sheep, and on the side where the hedge is growing; but few cattle will attempt to climb up when the fleaks or hurdles are placed near the edge of the bank.

As the expence of guard-fencing is greater where there is large cattle, than where there is only sheep, it would lessen the expence to keep them separate as much as possible, and likewise to keep the greatest part of the fields tilled for corn, or turneps, till the hedges were strong; but where the fields are immediately made pastures of, after planting I should chuse to fence in the following manner: that is, to make the bank three

feet broad at the top, leaning over a ditch that is three feet wide at D D : the other row of fleaks placed below the nether line of the plants, and leaning over that ditch.

Tilling and improving of dry and barren lands.

WHEN a farm consists wholly of such land as the warren (that is, dry sand or gravel), it requires the utmost industry imaginable, to render it capable of supporting horses and oxen to plow and harrow, &c. and cows to produce milk.

The first year, I think it impossible to be done ; for as the usual time of entering upon farms is at Lady-day, there is not then grass enough upon the land for the cattle, immediately required to prepare part of the land to sow with corn : for was that work deferred till the grass grew, it would occasion a scarcity of fodder the ensuing winter ; the land, before it be cultivated, will not produce much hay, consequently, there must be a want of fodder some part of the first year : but the expence would be least to buy in the spring, and to till the land as early as possible, by which corn and turneps might be acquired for winter use, and also better grass than before.

As much plowing will be required in a short time, proper instruments ought to be provided, to cause the greatest expedition possible ; the ploughs fittest for the purpose, are such as can be used in sand-land, with only two horses abreast, and guided with reins, by the man that holds the plough. The same sort of ploughs may be drawn by a pair of oxen, with a horse before them, where more strength is required ; these sort of ploughs are used in many parts of England (though
not

not universally) ; they are very short, with only one colter, the point of it stands before the share, and is much better than a plow with three, as there are some such made use of to cut the furrow in so many different places ; these ploughs require more strength of cattle to draw them, and are most liable to be displaced : for if any of the three colters meet with a large stone, the plough is generally raised out of the earth, and leaves a part unplowed (or balked, as it is commonly called), and was there only one colter, there could not possibly be so many interruptions met with. The method before given for rest-balking, and plowing obliquely the second time, will render the soil more easy to be pulverised with harrows, than if it had been plowed with three colters.

Harrows of various sizes, will be required, according to the different uses they are designed for : a pair of heavy ones (to be drawn by four horses, or oxen), are the properest to break turf, and to take out of the soil couch or other roots. When the soil is become fine, and clean of roots, light harrows are best, and their size ought to be in proportion to the breadth of the lands ; and where the lands are narrow, one harrow ought to be but half as broad ; two of them should be joined to each other with irons, as a gate is to the post that supports it ; the heaviest harrows ought to be fixed two together, the same as the light ones ; they will be much easier taken up to clean, than if the same weight was in one.

A roller will be extremely useful, both for corn, and grass-land : and a farm of this sort of land should have one constantly upon it ; they are best that are made of an oak-tree, the diameter not less than two feet, and if the length be about five, such are better to turn at the end of a land,

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than those much longer; they are properer for use upon narrow lands, and it is better to have shafts to them as a waggon, than any other way for the use of a farmer.

The tenant that enters upon a farm of barren land, must endeavour to change it's nature, and introduces proper grasses as early as possible, to make some better pasturage for his cattle before the winter comes on; and the more he plows the first spring, the earlier will the farm keep a greater number of stock, if seeds be immediately sowed; greater improvements might be made by more proper tillings, but that must be deferred on part of the land till next year. As the plots of an hundred acres each, will be pastures of a proper size for sheep, I would advise to prepare one of them for that use, by only common plowing and sowing the first spring, in the following manner, if the tenant be not admitted to plow before Lady-day, it ought to be done as soon as possible after. If there be a large quantity of dead grass upon the surface, or any other vegetable that will burn, before plowing, fire should be put to it in many places, on a dry day. This sort of land will produce either black or Poland oats, white pease, and tares, which the farmers in the North call lentiles.

As this land must be sowed after plowing, the furrows ought to be thicker on one side than the other, then every one will form a sort of drill, which will be a receptacle for the seed; and it will receive cover by the harrowing after; the furrow on the thickest side should be about four inches, for if much more the soil would not be so good, and if much thinner the harrows would not cover the grain with earth, but rather pull up the sods, if only the lighter sort were made use of.

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The position that the furrows lie in, is very material; for if they stand right upon one of their edges, the greatest part of the seed will fall betwixt them; and by harrowing and rolling will be covered so deep, as not to be able to reach the surface with the sprout from the kernel, but must perish in the earth; and if the furrows lie flat the seed will rest upon them, and the greatest part will not be covered with earth, by ever so much harrowing, the consequence of which will be as bad, as being too deep.

All lands will not admit of the depth I proposed: for in some there is a rock nearer the surface, which will limit the depth of plowing; but if there be an impossibility of plowing so deep as desired, the furrows ought to be thickest on the land edge: and that will cause them to lay properly to receive the grain sowed upon them.

It is best to sow the same day the land is plowed, for this sort of land, will then harrow the best: and if any fods be raised thereby, they must be placed in the hollows with the grass-side downwards.

As this land will be required for pasturage, I should chuse to sow it with trefoil, as being a cheap seed, and likewise proper for such soils; and if there was a mixture of rye-grass, it would come quicker in the spring.

If the trefoil be in the husk, and rye-grass mixed with it, about three bushels ought to be sowed upon an acre; but if the trefoil be milled, about ten pounds, and one bushel of rye-grass to each acre.

The seeds may be sowed either at the time of harrowing, or any other time before the grain comes up: if it be at the time first mentioned, it must be when the grain is sufficiently covered; and after sowing, harrow the land once more in a place to give the seeds a thin covering, for as they

they have but a small body, they ought to remain near the surface; and if they were sowed before the land was harrowed, then the covering of earth necessary for the grain, would be too much for them.

What I mean by sowing the seeds at any time before the grain comes up, is when the land is immediately to be rolled afterwards, which will give most of them a thin covering of earth: this work must be done when the surface is dry, or otherwise too much of the earth will adhere to the roller, and take part of the seeds with it; neither is it proper for the grain, to roll before the soil is tolerably dry, for when it is too moist, it is liable to bind too much afterwards. Rolling is of great service, for it does not only render the surface even, (which makes it better to rake upon in harvest) but it likewise presses the furrows close to each other, by which the soil retains a moisture proper for the young roots of the corn to feed upon, and was this land not to be rolled, there would be many large cavities under the furrows, so that the grain that lay in them, would perish for want of proper earth for the fibres to collect juices from.

Where the land is sowed with oats, it may be rolled after they are above ground, if the weather was too moist before; but the pease and tares are liable to be broke or bruised by it, and would not prosper so well after; therefore if there was much rain the seeds might be sowed, for they would not require any more cover than what that would make, by causing part of them to enter the surface, and if those above were constantly moist they would grow, for I have had both grass and turnep-seeds prosper extremely well, when they were sowed in rainy weather, without either harrowing or rolling. Any of the forementioned seeds may be sowed till the end of April, and buck-

buck-wheat (that is a great meliorater of land) may be sowed till the end of May: but it will not admit of any other plant to live under it, therefore it should be sowed upon land not intended for grass the ensuing year; one of the ten-acre plots may be employed that way. It is a good feed for horses, hogs, or fowls: and the land that it grows upon may be sowed with winter tares in November; and they will be found of great use in the spring.

I have not yet said any thing about sowing barley, but that I propose upon land pared and burnt, or what is called in some counties devonshiring of land, or denshiring it. This work must be begun as early as the farm is entered upon, that there may be as much of it as is possible improved that way the first summer: for when that work is rightly performed, and properly tilled after, the land will produce plentiful crops of corn and clover, for three or four years if required; and be in rich order after, for any sort of grass-seeds that the nature of the soil is suitable for.

This sort of enrichment is always to be met with where the warrens are, except there be many large pebbles, or other stones in less than an inch of the surface: for where they are the land cannot be pared.

As this piece of improvement is not universally known in the nation, I will here inform my readers how it is performed.

There are two different instruments made use of for paring: the one is a small plough, that is worked with a pair of horses, a man with them (in the fens of Cambridgeshire and Lincolnshire) will pare two acres of land in a day.

These are called Rockcliff-ploughs, but for what reason I am not able to account; the colter of one of these ploughs is a circular plate of

of iron, edged deeply with steel: it moves upon an axis fixed to the beam, and cuts the turf about two or three inches deep when it is used in the fen-land. The share is about a foot or fourteen inches broad in the web or fin, but the point is narrow; it is made of the same sort of metal as the colter; both of them are kept sharp, or else they are not fit for use: for the colter must either cut the turf extremely clean on one edge, or else the share cannot turn it over; and as the share goes so near the surface, it meets with many strong roots of grass that require a sharp instrument to cut them. This instrument is the most expeditious upon carr or moss-land, but not of any use where there are stones or roots of trees; they are of use in the places before mentioned as common ploughs, and extremely easy to work.

The other instrument is called by different names (in different parts of England); in the North a floating or paring-spade; in some places a breast-plough; and in others a denshiring-shovel. The parts which answer for the colter and share of a plough are both in one plate, about the thickness of a scythe, and of as good metal; the flat or share-part is somewhat more than a foot broad; but the forepart is made with a point; the colter is a part of the plate which forms the share, it is turned square, so that it stands upright when the share is flat upon the ground, and cuts the edge of the turf, as the share does the bottom; there is a socket at the upper end, into it is fixed a shaft of wood about seven feet in length; at the upper end of which is placed a hilt about two feet long, and not thicker than a man can conveniently grasp with either hand, and by that he guides it; and with strongly pushing both thighs against the hilt, he causes the plates to cut the surface of the land, and turns it over

over in pieces about three feet long; the breadth of each is about a foot, and the thickness one or two inches. It is excessive hard labour; but a good hand will plough an acre in four days: the labourer has a piece of wood against each thigh, they strike against the hilt of the plough, and their under-sides are covered with wool to prevent bruising the man's flesh.

The expence of burning is generally greater in the spring than summer; but at the entering upon farms of this sort it is absolutely necessary: for by it a good crop of barley may be acquired the first year, which will be of greater advantage than if it was only done early enough to sow with turneps; for as great quantities of fodder will be required to feed the working-cattle with, there will be straw for that purpose in the winter; and if clover be sowed with the barley, there will be a crop upon the land the next summer, either for pasture or to mow, which is a year earlier than can be had upon that part of the farm that is sowed with turneps; but some of both is necessary, and land ought to be prepared for the purpose.

To have land in order for barley, it should be pared as soon as the weather will admit of it in the spring: but as it cannot be performed in hard frosts, it is impossible to fix the precise time to begin.

After the land is pared in the spring, the turf must be burnt, as soon as it can be made dry enough; and if the weather be fair for ten or twelve days, it will not require much trouble, for a few turfs that are become quite hard will burn the others; but when there is much rain or snow it causes them to rot and not dry, except they be kept with turning or reared upon an edge: such methods are sometimes practised on all the turf; but

but I found it better to turn only every third row upon those next them: when their upper-sides are become dry, as they will by one fair week, which is much earlier than the land will be where they lie; though when every turf is turned, there is not any other place for them to lie upon, and by lying upon wet land it causes them to rot or break, by the worms working through them; but when one row lies upon another, it is then dry on the under-side, and will be fit to burn much earlier for it, though they may possibly require turning more than once.

The rearing of turf is, to turn them round, making one end meet the other so as to form a cylinder (hollow in the middle), standing up an end: these must be kept turning end for end in wet weather, or they will not dry, but grow at their lower ends.

It is not all sorts of turf that will burn without a little dry furze, heath, fern, stubble, or the like, and especially in the spring, if the soil be sand, for that damps the fire much more than clay does.

When the turf is fit to burn, there should be a small bundle of furze, or the like, laid where each fire is intended to be made, and the turf that is most dry laid upon them with the grass-side downwards, and the turned ones may all be laid on before the fires are kindled; the heaps ought to be made in conical shapes, but it must be observed to leave a small part of the furze uncovered (on that side of the heap next the wind) to place the fire to; but when that is done, turfs must be immediately laid there, or else the wind would cause the fires to burn too fierce: the fires should not be kindled till near night, for then they will burn much better than the day-time, and when they are become strong, the turf that was not turned may be laid on at various times, when it is observed that the fire breaks through the heaps.

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The fires should be attended on nights, and if any go out there ought to be fire carried with iron shovels to them from other heaps, where it may be spared: holes should be made with pokers from top to bottom of the heaps, which will greatly promote the burning.

In summer, when turf is extremely dry it will burn without furze, or the like: the method is to begin the heap hollow in the middle, by setting a turf on an edge, as it was reared to dry, with the grass-side inwards, and place three or four thickness the same way, making two heights of them: then put a shovel full of fire in at the top, and lay more turf to cover the hole, with the grass-side downwards, one end to the ground, and the other towards the top of the heap.

It is necessary to begin the heaps upon the bare ground, and not upon a turf that lays flat upon it, for that would deprive the earth of the benefit it would otherwise receive from the heat.

In the time of burning, it must be observed, when the fires are fierce, to lay upon them the wettest turfs, likewise ant-hills, or any other superfluous earth that is near, for by burning such things they make a rich manure; when they are become almost cold, spread them equally over all the land, with iron rakes and shovels; leaving none where the fires were, for there the soil will be sufficiently enriched by the heat; and the more heaps are made, the greater will the improvement be: and when it can be done without the expence of fuel, the fires may be made at no more than three yards apart.

The land that is burnt before the middle of May may be sowed with barley (immediately after the ashes are spread), and plow it in as thin as it can possibly be done (the irons of the plough must be kept extremely sharp), and after that rolled, as it will not admit of harrowing, for that would draw the

the thin furrows on heaps, and leave part of the corn without cover; I have had exceeding good crops after this method of tilling, and never sowed more than three bushels on an acre: for the land is so extremely rich after burning, that a great number of stems proceed from one grain, and when there is too great a quantity sowed, the straw rots before the corn is ripe.

If the weather be dry the seed may be steeped in a weak brine for twenty-four hours or more, it will greatly forward it's growth, for it will continue moist much longer than if it had been in water only; which is a method used by some.

If the land be not a loose deep sand, there may be about four bushels of cinquefoil sowed upon each acre, and plowed in with the barley: for as I proposed making the furrows thin it will grow through them; though I do not deem once-plowing to be a proper preparation for it, yet as good fodder is not to be met with upon such farms till it be propagated, I think the earlier it is done, the better able will the farmer be to support his cattle; and for that purpose he may sow some clover with barley, to mow the next year, and after plow it for wheat.

The work of paring and burning must not be stopped, when the season for sowing of barley is over; for the land thereby may be prepared for turneps, that will be of great service in the winter, and when it is too late for sowing of them, it will be early enough to get land in order for wheat or rye; and may be properly tilled to lay down with grass-seed the next spring if desired: for three times plowing, and harrowing as often in the summer, will destroy the roots of the natural grass, and mix the ashes with the earth.

The third or last time of plowing for turneps, should be at least four inches deep, and harrowed fine before sowing, to prevent the seed being buried;

buried, and after sowing rolling is the most proper, for it gives the seed sufficient cover, and the surface of the land will keep moist longer than if the seed was harrowed in, and not rolled.

Turneps may be sowed from the time that barley seed-time was ended, 'till the middle of July; the first crop, if they succeed, may be eat with sheep, early enough for the land to be sowed with wheat or rye; or if they should chance to be destroyed by small flies, there will be an opportunity of plowing again, and sowing more seed on the land; once plowing will be enough, for the land that is sowed first, as it must be plowed twice more for the wheat crop.

There may good kinds of durable grass be propagated on the land that has been plowed, as directed, for either turneps or wheat.

If there be a rock near the surface, cinquefoil is what I should recommend to get fodder from; for I have known it mowed more than twenty years on such sort of land, without ever having any manure carried upon it; and when the land was plowed it produced good crops of corn.

I have likewise seen it prosper very well where there was only gravel for three feet deep, without water standing amongst it; but it will not live long in deep sand; but the perennial red clover will endure many years upon such land, and it makes good fodder; rye-grass will do the like, and some of both may be sowed together.

If the land be intended for pasture, white clover or trefoil are proper either mixed or separate; and for the sake of grass early in the spring, there may be a little rye-grass-seed sowed upon the same land; one bushel of it will be enough with eight pounds of either of the other, upon an acre.

I would not advise the sowing of rye-grass alone, for though it grows early in the spring, it will not

make any fresh leaves in the summer months, except there be uncommon quantities of rain.

If the surface of a whole farm be so full of stones, that it cannot be pared, part of it must be sown with pease, oats, &c. as before directed; and the other may be improved, by burning such roots as may be collected together by harrowing, after proper plowings in the spring and summer, in order to sow with turneps, wheat, or rye, at the proper seasons.

I have before given some directions for this work, before planting of hedges: and the same method of plowing, is what I recommend for land that has been a long time grass, or such as is become full of couch by bad plowing.

At the times of harrowing, there should be three persons to attend a pair of harrows, that the couch and other roots (that the harrows draw up) may be collected into heaps in all parts of the field; for when there is only the person that drives the horses, he seldom cleans the harrows till he comes at the end of the land, and then most of the grass, roots, &c. is brought there, though they ought to be burnt in various places, and their ashes spread over all the land.

There must be a rope fixed to the hinder parts of the harrows, and one person should keep hold of it, to lift them up when clogged; by that the earth and grass-roots will drop from them, and the third person should rake it aside, and lay it in small heaps upon that part of the land that has had all the harrowing that was intended. The readiest way to perform it is, to go as many times in one place as is necessary, before any other is begun upon; and by that means, the grass-roots will not want moving any further than the breadth of the harrows.

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The land that is only plowed once in the spring, and sowed with either barley, oats, pease, or the like, cannot possibly be made clean, for many roots of the natural grass will live; and where there is not any clover or other seeds sowed with the corn, the land ought to be plowed immediately after the crop is taken off: and if the weather be tolerably dry, it may be made in good order to sow with wheat, by being plowed and harrowed two or three times, and burnt as before directed.

I imagine the expence of burning couch-grass and other roots, will be deemed unnecessary: for if they are killed by plowing and harrowing, they will rot and become a manure for the land; or if they were carried off and laid in one heap, by many times turning they would become fine mould, that would greatly enrich either tilled or meadow-land; but I am well assured, neither of the methods has so good an effect as burning: for I lately had a small parcel of land committed to my care, which had little else growing upon it than heath, and some fern: the surface was strong gravel with a small mixture of sand.

Part of the land had been plowed the summer before, and by that means most of the heath, &c. was killed, and become rotten.

I ordered the plowing of the whole piece in May, and before the middle of July I sowed it with turneps; but before sowing it had been three times plowed, and as many times harrowed and burnt, as before directed; the crop was extremely good where there was the greatest quantity of roots burnt. as on that part of the land that had not been plowed the summer before: when I shewed the crop to people of observation, they were convinced that burning was much better than to let the matter rot.

At the time of entering upon a farm of this sort, as many sheep should be provided as can possibly be supported; for their excrements by folding will greatly enrich the land, and the proper sort for that purpose is barren ones, from one to four years old; for if they were ewes that suckle lambs, it weakens them, both by driving them every night and morning between their pasture and the fold, and likewise by being confined from their feed in a morning.

The sheep ought not to be bred upon better land than that they are to be kept upon after; for if they were they would not thrive, and perhaps many of them die; therefore I would advise to buy them from land of the like nature; and if they had been folded before, they will be much the properest for the purpose.

The size of the fold should be in proportion to the number of sheep; two superficial yards to each will be enough, and that will manure the land in one night sufficiently for a crop of wheat, which will be much less liable to blight, than if it was sowed upon land manured with dung from a stable-yard.

There are various methods practised in sowing of wheat, and where Mr. Tull's rules are not followed, I have not found any better (upon lands that are well tilled) than to sow and plow in about ten pecks on an acre, and make the ridges about four yards broad; the seed will be better covered than if the land were plowed first, and then harrowed to cover the seed: and the wheat will be less liable to be pulled up by harrowing in the spring, either to kill the annual weeds, or to give cover to grass-seeds if sowed then.

The whole month of October is a very proper time for sowing of wheat: but where a farmer has more than he can do, then it is better to begin earlier, than to have part to do in November;
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for then it is a long time in coming up, and very liable to be destroyed in part by rooks or other fowls.

There are many receipts to preserve wheat from being blighted, by steeping the seeds before sowing in strong brines: but I have not found any of them effectual upon all sorts of land; and particularly on such as has undigested manure in it, or where long grass or stubble is plowed in at the time of sowing: I saw an instance of this in a piece of land, that had clover upon it 'till June, and after that was twice plowed before the time of sowing the wheat: part of the field was wet land, and that had not much clover upon it, but a bad sort of long grass, that was not killed by the summer plowings, as the season proved moist: and there the corn was blighted, though the other parts were extremely clean; the seed was all steeped forty-eight hours in brine (made with two pounds of salt to each gallon of water), and mixed with lime the night before sowing.

The last day of sowing the same field, there was a small quantity of seed wanted, and not having any steeped, I ordered some to be sowed dry; and though the land was not full of grass or undigested dung, yet there was some blighted ears in the crop.

The like difference has appeared by various sorts of manures; for I have known one part of a land folded with sheep, and the other covered in summer with dung from a crew-yard, that was mixed with long straw, that did not rot before the time the wheat was sowed; this part of the land produced blighted corn; and where the sheep was folded, the crop was otherwise. To prevent the ill effects of stable-manure in wheat-land, it may be carried out of the crew-yard and mixed with lime, or soil from ponds or ditches; and by turning two or three times over in summer, they will be mixed together, and fit to lay upon the land that is intended to be sowed with wheat in the autumn;

dung thus prepared does not required to be mixed with the land before sowing, any other way than harrowing of it about, before the last time of plowing.

This method of preparing is extremely proper for land that is kept constantly in tillage; but there is much less salts in the dung alone, than there was when first made, for most of the salts drench from it with the water that may be frequently seen to run from a dung-hill, either in the yard when it is made, or after it is made into a heap on another place; and the same dung would improve more grass-land, was it laid on before it was rotten; as it may be upon a farm of that sort of land as I am treating of.

The manure that is made upon one of these new farms the first year, I think cannot be better disposed of than on the clover, and may be carried and spread directly any time in the winter; the properest time for doing it is in frosty weather; for then the land will best bear the carriage; and if there be snow upon the land, it is the better; for when it dissolves, the salts from the manure will enter into the earth with it.

Some part of the manure will appear as dry straw upon the land in the spring; notwithstanding this, the clover will grow through it, and be greatly strengthened thereby; it will not only receive an advantage from the salts which entered the soil, but the straw will shelter it from the frosts, and keep the land from drying too fast in the spring.

Manuring upon clover, and plowing as before directed, will render the land fitter for wheat, than if it had been tilled in the spring, and many times in the summer; for clover-roots when killed, causes wheat to prosper greatly.

There are two advantages reaped by it; a good crop of clover, and the expence of turning the
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the dung-hill and carrying it a second time is saved.

The lands which are manured with new dung, are not so liable to produce annual weeds, as other lands: for being laid upon the surface before spring, the seeds grow then, and are afterwards killed by the clover over-heading them; there is no manure from a farm-yard, but what has either cadlocks or other seeds in it; and notwithstanding the dung-hill may have been turned two or three times over, yet many of the seeds will remain sound, and grow when they are near the surface. I have seen many instances of this, even in dung-hills that have laid more than one year; and land likewise that had been grass time out of memory, has produced cadlocks when plowed.

I have before observed, that a pigeon-house would be of great advantage upon a farm of barren land; their dung makes very great improvement, either upon grass or tillage, especially for wheat; but as the method of using it is not familiar to all farmers, I will therefore give it here, according as I have known it done with great success.

A month (or if more the better) before you want it for use, it should be taken from the place where it was made, and laid up in a heap in a dry room, and turned over every week; the lumps must be broke 'till they are as small as chaff, and if by turning they do not become small enough, it may be threshed with flails, in like manner as corn is, to separate it from the straw.

About twenty heaped-up bushels may be sowed upon an acre, and plowed in with the wheat, rye, barley, oats, or any other grain, or harrowed into land where turneps are to be sowed.

Coal-ashes (that have been kept dry) or foot may be plowed or harrowed in as the former, but

a double quantity is required. The black earth from bogs is good manure when burnt, and sometimes it is done in large heaps, and the ashes carried to the land; but it is of more advantage to carry it to the land first, and there burn it in little heaps as turf is.

Lime for improving of land, is used various ways, and so is the quantity likewise, for an acre of land; for some sort is much better than others, especially that which is made from hard stones of a grey colour, it is more than double the advantage to land, than that which is made from chalk, or soft stone; and the difference betwixt that in the lump before it be slacked, and after it is become powder, is very great. for two bushels of the former will produce more than three of the latter.

If lime * be slacked before it be laid upon the land, it may be used at the time of sowing wheat, as pigeon-dung is; and about fifty bushels is sufficient upon an acre; but double the quantity of chalk-lime is required.

Where it is possible to bring lime to land in the lump, it is of greater advantage than if it was in powder; for the heat it produces (when caused to expand by moisture) greatly enriches the earth near it; the method I think best is, to make heaps of five or six yards apart; their size in proportion to the quantity intended for the whole; throw a small covering of natural soil over each of them; let it be so thin that small showers may go through it; and immediately before you sow the land, spread the heaps over the surface; this improvement is proper for any of the former crops. If the farmer is obliged to provide the lime before the land be prepared for it, it may be laid in large

* In measuring of lime, I suppose the bushel to be heaped up.

heaps, with mud, or any superfluous earth from lanes or the like, mixed with it: and let the whole be turned over once or twice, before it be carried to the land; this mixture is proper for grass as well as corn and turneps.

The ashes which Soapboilers have drawn their lees from are good manure: about eight large cart-loads are enough upon an acre; but after they are laid on, it is proper to harrow the land before plowing, otherwise they would remain in large lumps.

Human urine is an excellent manure, about twenty hogheads, with proper tillings, upon an acre, will make it very fit for a crop of wheat.

Where there is strong clay to be met with near, it will pay the expence of carriage by the improvement it would make, without any mixture of dung; but it ought to lay a whole winter upon the surface, and be many times harrowed; for that reason it is properest to be laid upon grass-land, especially such as produces moss, for clay will destroy it, admit there be about twenty loads laid upon an acre.

I am apprehensive it will be impossible the first summer in autumn to till, manure, and clean, all the land that was plowed and sowed in the spring: and what is not got into good order may still be made useful, for though it is not proper to sow with wheat, yet it may be sowed with rye in the beginning of September, and that will afford feed for sheep 'till the latter end of March, and produce a crop afterwards; otherwise it may be grazed 'till the beginning of June, and after that sowed with turneps; this method will greatly improve the land, admit it be plowed three times, and the roots, &c. burnt after each time of harrowing as is before directed; and if it be made quite clean may be sowed with oats or barley the next spring and grass-seeds.

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If any of the land that was sowed with wheat be not clean enough to lay down with grass-seeds, I would advise the harrowing in the spring about four pounds of parsley-seed upon an acre; and as early as possible in the autumn the stubble should be taken off the ground; this will cause the parsley to thrive, by giving it more benefit of the sun's rays; it will make very wholesome feed for sheep for a whole year; and their excrements will greatly improve the soil. The parsley-roots will most of them die when the second winter approaches, then I would advise it to be covered with clay, which should be harrowed 'till all the clods be dispersed; the times of harrowing must be at fifteen or twenty days apart, when the clods are observed to crack; this land will be very proper to be tilled in the spring to get an early crop of turneps upon, and if prepared by plowing, harrowing, and burning of roots, it will be fit to sow with wheat in the autumn, and laid down with grass seeds, by being harrowed and rolled in the ensuing spring.

Winter tares might be sowed in the month of October, upon some of the land that is not made clean; they afford much feed for sheep in the spring, and are likewise good for milch-cows, or horses, when they are long enough to be mowed; and if the crop be eat upon the land, it may be prepared for rye in the autumn, or if any amendment be laid upon it it may produce wheat; but upon dry lands that are poor, I rather advise the sowing of rye, as being the most certain to succeed, and is a very useful grain for the fattening of hogs, or to mix with wheat to make bread of: it renders it sweeter and less dry in the summer than wheat alone, and more esteemed by many.

The ordering of young grafs.

THERE ought to be great care taken of young grafs, especially the first winter and spring, or else a prosperous crop may be destroyed; for their roots are but weak, and liable to be drawed out of the ground by sheep or horses feeding upon them in the winter, and spring: I have observed the most prejudice done to them immediately after a deep frost; for this reason all cattle should be kept from them at such times; and all young grasses that are intended to make pastures for years to come, or others that are designed for mowing, should not have a horse feed upon them later than October, nor earlier than May, admit they are eat in summer. Cinquefoil, of all ages, should be preserved from horses in like manner, 'till after it be mowed: and if it was possible to keep all kinds of cattle off the young grafs designed for pasturage from November 'till April, it would be the stronger for it; but most people are desirous to give their sheep grafs when it is in their power, and are apt to put too many on at a time, which soon eats a tract of land very bare; therefore I would advise there should never be more sheep in the winter upon young grafs, than half the number of the acres the field contains; that is, one upon two acres.

Where dung can be had, thin covering laid upon young grafs in November, or December, will be of great advantage; or if strong clay can be met with near, I would advise to lay ten or twelve loads upon each acre; the various sorts of weather in the winter will make it tender; and whenever the clods are observed to crack, a large thorn-bush should be dragged with a horse, all over the ground in a dry day; or, for want of a large bush, small ones may be used, by fixing them in a harrow, gate, fleak, or hurdle.

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The black earth from bogs, called peet, or moss, may be used in like manner as clay; the frost will have the same effect on it; but the ashes made from it would be of much greater service; when the land is made fine by harrowing, it should be rolled two or three times in the spring; after the strong frosts are over, this will greatly strengthen the roots.

This sort of land is very subject to produce from seeds, either furze, broom, or heath; all of them are very prejudicial to grass, therefore it is best to draw them by hand the first winter; they will come up best when the ground is moist, and directly after the breaking of a frost; at this age they need not any instrument to be fixed in the ground: but if they are two or three years old, they cannot be taken up without a spade, or some other tool to loosen the ground, and by that, other seeds are brought up to the surface, and produces plants, and many times part of the roots are left in and does the like.

There is frequently upon dry lands a large kind of thistle, which comes plentifully from seed; it is best to draw it up the first winter, otherwise it will spread to a great extent, and destroy much of the young grass.

If the common sort of thistle, or any other weeds, grow amongst the young grass which is made pasture of, they may be destroyed by mowing two or three times in a summer.

If any of the former weeds grow amongst the saintfoine, or clover, intended to be mowed, they ought to be cut out with hooks, or knives, that will weaken the roots, and render the fodder better than if they were suffered to live 'till it was mowed.

The ordering of old saintfoine, and other grasses.

WHEN the land is covered with moss it greatly weakens the grass, therefore it ought to be destroyed; good manures are the most effectual, but most expensive, and are not to be come at in all places; therefore other methods may be used that will be of some service.

Bush-harrowing three or four times over in the spring, each time contrary way to the other, will pull up much of the moss, and kill some of the other by covering it with earth from the worm sprouts. If saintfoine land, or others that are intended to be mowed, be strongly covered with moss, the old sod walls, or any other earth would be of service alone; but much more so mixed with lime, or soot.

Plowing immediately destroys moss; but it is pity to destroy a crop of saintfoine that is well planted, for old roots produce much stronger branches, and more in number than those that are young.

Lands sowed with trefoil, and white clover, that have been frequently pastured, may, at the end of five or six years, be plowed and sowed with oats; and after that crop is taken off may be sowed with wheat, or rye, according as it is in strength; and if it be clean from couch, other grass-seeds may be harrowed amongst the wheat, or rye, in the spring; and if it be not clean, throw upon it parsley-seed, for to feed off with sheep the next winter, and spring; after that till it for turneps; but observe this, to lay your dung upon it in the winter, and not after it is plowed, for the reasons I have given before.

If you have too little saintfoine, or other mowing land, I would advise clover-seed to be sowed with the first crop, and if manured in the winter, will produce much fodder, and a good crop of wheat

wheat after; amongst which any kind of grass-seed may be harrowed in at spring.

As this sort of land is liable to produce much poppies amongst the corn; I will here observe to my reader, an uncommon, but expeditious, method of destroying them: when they are got about a foot high, hogs will eat them very greedily, and not injure the corn.

Hogs are likewise of great service in fields that are fallowed, for they are extremely fond of eating all kind of thistle, and cornbind, or convolvulous roots, which grow amongst corn.

Oxen are as capable of plowing, or other works about home, as horses are, and improve sand-land by treading; therefore, I think they are most profitable cattle to do that work, for they are kept at the least expence, as not requiring any corn, and less liable to distempers, or blemishes, than horses are.

P A R T the Third.

Raising of Wood for Timber and Poles upon barren Lands, by sowing it with Corn.

WOODS that are cut for poles make the earliest profit, and the raising of them from seeds will not be a great expence: the land intended for that purpose ought to be made extremely clean from grass, or weeds, before it be sowed; trenching with spades is the most effectual method, but all lands will not admit of it for want of soil; the expence is also great, and but few Gentlemen would like to have it done, where large plantations are intended; therefore I shall recommend the tilling of the land, and sowing it with turneps, where it is possible to be done, as I have
before

before directed; I will not limit the number of times it ought to be plowed and harrowed, for that must be as necessity requires.

The turneps ought to be kept extremely clean from weeds by hoeing, lest any seed should be shed, and they should be eat upon the ground by sheep, whose excrements will greatly enrich the soil, and the earlier it is done in the winter the better, for then there would be time to bring the land to a fine mould before sowing, it may be done by once plowing, without any harrowing, for the frost will make the clods break.

The cheapest method I know of raising wood is, by the seeds sowed with corn in the spring: those I have propagated that way are oak, Spanish chesnut, ash, maple, and holly; these three latter must have their seeds kept in sand, or fine mould (in the open air, that they may have moisture), from the time they are gathered, 'till March, or else they will not come up the first year after sowing. Acorns and chesnuts grow a year earlier than the other seeds, and may be kept in a dry room, from the time they are gathered, 'till the next spring; and if they be sowed then they will come up in May, or earlier, but they must be laid thin, and kept with turning when first gathered, 'till they become dry, or otherwise they will make sprouts then, and not grow after sowing.

After the turneps are eat up by sheep, the land should be immediately fallowed, by which means it will become tender before it be sowed.

The month of March is the properest time for sowing barley, or oats, and the other seeds may be sowed at the same time; where Mr. Tull's Drill-Ploughs are in use, they are excellent instruments for this work, but for want of them a person should drop the seeds betwixt the hind horse and the plough, in every third furrow, by that the rows of plants will be at about a yard apart; but as oaks,
or

or chesnuts will not be required nearer each other than four or five yards, the acorns, or chesnuts need not be put into all the rows.

Half a peck of acorns or chesnuts, are enough upon an acre of land: but of the ash, and maple-keys, there may two bushels be sowed on an acre. I would advise the sowing of the corn first, and to plow it in, and not to harrow it much after, for that will be liable to move the acorns from the rows they were sowed in. There should not be many hollies sowed, for they will not make much profit; though they are an ornament, and in some measure shelter other trees from the winds.

The plants seldom rise so high the first year as a man mows, therefore they are not in danger of being cut with the scythes; but if they should be taller than common, then the crop ought to be reaped; and immediately after the corn is taken off the land, the spaces betwixt each row should be turned over with a breast-plough, and the stubble-grass, &c. picked with hands from amongst the plants, this will give them air, and strengthen them greatly; and if that work be repeated two or three times the next summer, there will not be any more weeding required; and if there was much corn shed the land ought to be twice turned over the first autumn.

If a few seeds of birch, hornbeam, or beach, were put in, they will make large poles, at every time of cutting; they ought to be placed at the greatest distance they possibly can be from the oaks, or other trees intended for timber, otherwise they would overhead them, and either kill, or render them crooked.

The second winter the plants will be of proper size to remove, and all the rows ought to be examined, and where those intended for underwood, are at a greater distance than three foot from each other, there should be some planted; and where they

they are less than half a yard apart, there is as great a necessity to take some up (or else they will spoil one another), by this means the vacancies may be filled; where there is a rock near the surface, neither oaks nor chefnuts will prosper; there I recommend the planting of elms of three foot high, at five yards apart; their roots run more horizontally than the former, and will thrive better in such soil. Where plantations are in bleak situations, two rows of firs, at six feet apart on the boundaries, would give great shelter to the other plants; and if there were one or two upon each acre within, they would do the like.

The like regard should be had to those sowed for timber; they ought to be above five yards apart, and neither ash, nor other tree less than four foot from them, lest they should overhead them; this thing should frequently be observed, and rather destroy any plant intended for underwood, than it should injure one designed for timber.

The shapes of trees may be greatly improved in their youth, by taking off the strongest of the collateral branches; it will much strengthen the upright, or leading shoot; and at every time of cutting the poles the like should be done; it will be a great advantage to the underwood, for where the timber-trees have large branches left upon them, they either kill or weaken the others, by depriving them of sun, and likewise of the dews, which very much feed all trees. The timber will likewise be much better for it, if properly done; for if a large branch be suffered to remain, it causes a knot in the timber, if it keeps alive, but I have observed many dead ones of a foot in length, or more, remain upon the trees for many years; these are continually decaying, and the wet passes through their pores, and causes the body of the tree to decay; but were either those, or the growing ones, cut off about an inch from

the body, the rind would grow over it, and preserve the timber.

The part cut should be made extremely smooth, and quite perpendicular, otherwise the wet will rest upon it, and enter the body of the tree.

Winter is the properest time to take off large branches, for late in the spring the rind will part from the wood, and make a greater wound. I have caused branches to be taken off of six inches diameter, with a hand-saw, and after made even with a smoothing-plane; those cuts I have known covered in five years, and if branches be taken off in their youth, the wounds would much sooner be healed over; when large branches are taken off in dry weather, a covering of paint will be of service. I have seen the ill effect of cutting large branches, at a foot in length or more from the body of the trees, for some of them have died, and the timber received wet through them; and those that lived, occasion the same knot to remain in the body as though they had not been cut.

I will not limit the number of years that the poles must stand before they are cut, for on some land they prosper much faster than on others: and when they are of a size fit for the use of the country they are in, that undoubtedly will be the properest time to cut them.

I do not imagine any one will attempt to cut the poles 'till they are most of them twenty foot high, for then they will be fit for hop-poles, and many other uses for a farmer; and they will then have drawn up the timber-trees with tall and streight stems; that is one of the reasons I choose to plant them so near as a yard to each other; for all trees grow better at that distance, than those that stand single: and though I propose a timber-tree to be planted at every five yards, yet I am sensible they cannot swell to any great bulk

bulk at that distance, but will greatly shelter each other, and especially when the poles are cut the first time; but at other times of cutting poles they may be in part taken down, that is, such as are the weakest, for the thickest ought to remain, as being the most healthy, and likeliest to make the largest timber; but at the time of thinning them, there ought to be nearly an equal distance betwixt those remaining. I think ten trees upon an acre is enough to remain for timber; but if the largest of their collateral branches be taken off at every time the underwood is cut, there will be room to train up some young ones amongst them without injuring the poles; the number I should advise upon each acre is twenty; that is, when the first that was raised are reduced to ten, then leave ten of the poles that come single, and not from old roots, these ought to be of ash; they will be extremely useful at the next time of cutting the poles; for they may be supposed to be thirty years old, for such land as I am speaking of will not produce good poles in less than fourteen or fifteen years; and if ten poles be left at each time of cutting, there will then be ten of double age to take down. And when it is deemed requisite to fell some of the timber, part of them may remain to compleat the former number. Ash will cleave at the age mentioned, and be of great use in carriage; but elm is not of much value 'till it be a foot, or more in diameter; for that reason I do not advise any of them to be left, except they remain for timber. If the land be agreeable to oaks, some few poles of it may be left, though they will not be useful so early as ash, yet they will at other times of cutting, for when they are fifty or sixty years old they will have hearts in them, and may either be taken down or else left to make up the number, when part of the large timber is taken down.

I have had the care of thinning of woods that were about thirty years of age; some chiefly ash, and others that were all oak; their rows were about a yard from each other, and many tall and straight trees of both sorts; but one ash-pole was of more value than two oaks: for that reason I recommend the sowing of both, rather than acorns alone.

Note, It would have been more profit to the owners, had they been thinned earlier, for many of the poles were killed and decayed, by being overheaded by others.

N. B. There is a noble Duke (whose name has been mentioned before), who has oaks more than fifty feet high, that were sowed with oats in one of his parks; but if a Gentleman chooses to lose the advantage of a crop of corn, they may be sowed alone, and then he may have the pleasure of seeing them grow early the first summer, in which they will make stronger plants than the others, admit they are kept clean from weeds; but at the end of twenty years, there will not be any perceptible difference.

When an old wood is become too thin of roots that produces underwood, at the time of cutting there should some be preserved near the vacancies to make up the deficiencies, which may be done in the following manner, viz. by cutting them something more than half through, as nigh to the root as possible; then press them flat to the ground, in the places that are too thin; but all branches should be cut off, and a trench of six inches wide, and two or three deep, should be made for them to lay in; but before they are fixed, a cut should be made at a foot from each other, on the under side, which causes them to make roots; if part of them be covered with earth, the others that are bare will put forth branches.

P A R T

P A R T the Fourth.

Raising Wood, by planting, both for Timber, and Poles.

BY planting, a Gentleman may earlier obtain growing-trees upon his estate, than by sowing the seeds amongst corn; I would not advise any one to do it upon barren land before it has been properly cultivated; for I have known several baulked of their expectations by such attempts.

The land that is intended for timber and poles, ought to be prepared before planting; as that for the raising of hedges upon.

If a Gentleman be provided with plants, they will prosper best to have them put in before any corn be sowed upon the land; the succeeding crop will pay the expence he had been at before, and likewise of planting (exclusive of purchasing the plants) if the work be done immediately after the turneps are eat, there does not need any more plowing to prepare it. The land ought to be plowed as soon as the corn is taken off, then that which was shed will grow, and become good feed for sheep by the end of October, which will likewise improve the soil; but observe, that after plowing, the land should be immediately harrowed, and the stubble and all other combustibles that the harrows draw out, should be burnt in small heaps, and the ashes spread over the land, which will be nearly an equivalent to the salts which the crop of corn had drawn from the soil.

There ought to be a number of sheep sufficient to eat the young corn clean down to the earth by

the middle of November, for that is a proper time to begin to plant.

The plants intended for timber may be oak, chefnut, and elm; this latter to be from layers that have been planted one year from the mother-plant, and the other two kinds to be two or three years old, but not more, for tall plants will not prosper if the situation be high; and if they have been kept clean from weeds in the nursery, and not been too thick, it is not material whether they have ever been removed or not at that age.

Those I would recommend for underwood are, ash, maple, birch, beach, hornbeam; and for the sake of their blossoms, a few wild cherry-plants, at two years old, are very proper, about a foot in length, and if they be more I would have them cut to that size.

To make more variety of colours there may be some of the asp, arbale, or black poplar, and also some red fallows and willows; these are all raised from cuttings, and are very useful in poles, as well as for rails, or any sort of common fencing; besides, fallow makes very durable hop-poles, and is likewise much used by the turners and clog-makers; and, in short, no trees grow freer upon dry barren land than those last mentioned.

There are various kinds of fallows, but the best is easily distinguished from the others, it has broad leaves almost round, and the rind of the young wood is of a bright brown colour, and the poles are the same at heart.

Before planting I do not dig the ground, nor make holes for the pole-wood, for as the soil is thin they ought to have as much of it under their roots as is possible; and to obtain that, I lay their roots upon the surface, and earth upon them. It is a method I have known practised for near forty years, upon various sorts of land with good success;

cess; and I have found it to have the best effect of any upon thin soils, where there was either a rock, creach, or gravel near the surface; but as all such are deemed burning-lands, some people I have known to plant deep, with an intent to guard against drought, but their works have not prospered.

The first instrument that is made use of for this work is a common plough, drawn by two horses double; the man that holds, guides the horses without any driver, and along one side of the plot turns a furrow inwards, so far as the plantation is intended to be; then returns at the distance of six feet from the outside of the former (or from the part cut by the colter); these two furrows form a bed of four feet in breadth; and by returning back at two feet from the second furrow, that forms a space of four feet betwixt the beds likewise; though there is two feet of earth unmoved in the middle of it; and in like manner the whole tract of land must be divided.

I would advise to have the first furrow made crooked, and all the others parallel to it; for where the trees are in streight lines, there is a stronger current of wind passes betwixt them, than if they stood promiscuously, neither are they so agreeable to look upon.

The plants intended to produce poles must be placed first, and those raised from seed should be taken up with care, lest the roots should be broke off, for it is not proper to loose any part that can be saved, neither should they be suffered to lay out of the ground to be dry, or penetrated with frost, for the small fibres are liable to perish by either, and they are the most useful parts of the roots, and ought to be preserved; for whoever takes up a new planted tree in the spring, may observe they are the first that make new roots, and undoubtedly collects juices from the earth, which forms leaves and branches.

The cuttings of fallow should be about twelve or fourteen inches long; and of wood more than one year old; two or three is the properest.

The poplars I have observed to grow the freest when there is a young bud at the end; but there must be a part in the ground that is two years old, for younger wood will not make roots.

An acre of land will require about five thousand five hundred plants; when the ground and plants are prepared, they must be laid in the beds about two feet apart on each side, with their heads resting upon the furrows, and about even with the outside of them; immediately after, they must be covered with the two feet of earth that was left unplowed betwixt the beds; but as the land will be made firm by sheep treading upon it, it is possible that great clods may rise in digging, but such I would not chuse to have laid directly upon the roots, but to cover them first with thin spits, or such as are broke small; and let them be gently trod down to each plant, as well the cuttings as those with roots; and lay more earth on after, 'till the middle part of the beds be raised even with the tops of the plowed furrows that were throwed upon the sides; the two feet of earth left unplowed, will not be sufficient to raise the beds so as to cover the roots, except it be taken away deeper than the plough went on each side: but that must be done by sinking the whole space or alley betwixt the beds; this will occasion one part to be more than a foot higher than the other; and it may possibly be imagined, that the wet would descend too early from the plants, and for want of moisture they would not prosper, especially where there is either a rock, creach, or a strong bed of gravel near the surface; I am convinced by experience, that plants thrive much better this way than others on the like soil, planted where the surface was even; and there are strong reasons why

why they should; for in the first place, the roots have more soil to feed in, as being further from the dry and barren strata of gravel, &c. and during the time the beds support them, the other hard matters in the alleys are improved by the frosts, and rendered tender enough for the roots to enter; which the horizontals naturally do as they increase in length, and meet with soil that they can penetrate, be it ever so nigh the surface; and when they are entered the alleys, or spaces betwixt the beds, if the wet runs from the one part, it enters upon the other where there are roots, and it is impossible the wet should descend directly downwards to the gravel so early through the soil of the beds, as it can do upon the even surface where the covering of earth is not more than half the thickness.

This method of planting is as proper where there is a strong clay near the surface, as it is on the other soils.

What I have said upon planting for poles, or underwood, I hope will be understood by those who desire to make use of the rules laid down; but the method of planting on the same land for timber, is to be done afterwards, and in a different manner.

The plants for timber ought to be taken up with the same care, that is, not to lessen the quantity of roots any more than cannot possibly be avoided, neither should they be suffered to be dried; for that reason it would be proper to have the holes made for them before they are taken from the nursery; the holes must be of different sorts, according to the sizes, and kinds of plants they are intended for; for an oak, chesnut, or any other plant that ought to have their tap-roots preserved, should have deeper holes than those that have only horizontal ones; however, there should

should be room for them to be fully extended, in like manner as they grew in the nursery.

The elms, of the age I proposed, will not require holes to be made for them more than five inches deep, for their roots run horizontally, and if the uppermost be only two inches below the surface it is enough; for when the holes are deeper than the plants require, it only causes a necessity of having earth put in again before planting; and by laying light at first it settles after, and the plant with it, too much below the surface; and I think it best to have the holes solid at bottom, with a covering of light earth about an inch thick, for the roots to rest upon; but it is not of any service to make preparations for them to strike deeper.

I imagine a yard will be wide enough for a tree of a year old; but it is possible some may require more; if so, an addition may be made at the time of planting.

The distance proposed for the elms, &c. is about five yards apart; and though the middle of the beds are but eight feet from each other, yet there may be some plants for timber upon all of them; for if they are at twenty-eight feet from each other upon every bed, and planted in quincunxes, they will be nearly the distance apart that is proposed.

The depth of the holes for oaks, and chesnuts of two or three feet high, ought to be at least eighteen inches deep, and three feet wide in the top, that the uppermost roots may be extended to their full length; but the holes need not be more than a foot broad in the bottom, to receive the tap-root, which ought to be preserved of as great a length as can be at the time of taking up in the nursery, and all the others ought to have the like care taken of them, and not suffered to become dry before planting; but all roots that are cut with a spade should be made a little shorter
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with a sharp knife, to make them smooth, by which they will heal over the earlier, especially if the cut be made on the under side.

Though the plants here proposed are but small, yet there ought to be two men employed at each tree at the planting of them; the one to put earth to them, and the other to place the roots; for those that grew horizontally before moving, should be placed in such positions again, as nigh as possible; and to do that, the person that has the plant in his care, must hold up the horizontal roots 'till the other man has filled the hole with fine earth, as high as the part that they proceed from; then extend them singly upon the earth, as far as they will reach, and a covering of two inches thick upon the uppermost will be sufficient; and that ought, when gently trod down, to be even with the surface of the bed; the leading branch of all the kinds mentioned should be preserved; but if there be many collaterals, part ought to be taken off; but not altogether, only thin them by taking off the strongest, and leaving the others; for were all the under ones taken away, and the upper ones left, it would render the plant top-heavy.

Trees of this size will not want tying for to keep them steady; but they ought to be observed in the spring, and the earth trod down upon them, for the frosts are liable to lighten the earth, and loosen the plant: where trees have much the greatest part of their roots preserved, they will not require watering; so that keeping them clean from weeds is all the expence required the first summer.

It would be of great advantage to the plantations, if there were firs upon the boundaries, and likewise a few in other parts, if the tract of land was large; they would shelter the other trees; the distance of six feet from each other on the outsid

outsides, and two rows of them would meet each other and make a good appearance, especially if they were different sorts, for that would make variety of colours; and they would answer the intent of shelter, as well as though they were of one kind only, for any of them will grow well upon dry land; but I should chuse to have the fewest of the Scotch firs, the wood being very porous, and such as the ordinary white deal is cut out of, which is much less valuable than yellow, that the spruce and silver afford; this I speak from experience, as I have seen all the three kinds broke up from one plantation.

Firs may be replanted with safety, of almost any size, if they have been properly managed in the nursery; but where many are required to shelter a wood of forrest-trees only, I imagine large ones will seldom be made use of, as being much more expence than small ones; for if they are to be purchased, there is great odds in the price and likewise in carriage; and if a Gentleman has them by him, the expence of planting and confining after, would be more than plants of two or three feet high might be bought for, and such would not require either stakes or lines, and that is the size that I should choose to plant; for, in short, others would be hard to meet with, for there are but few gentlemen who keep large numbers in their nurseries of twelve or fifteen feet high: neither do nursery-men, except they are under contracts made some years before.

To render firs of all sizes safe in their removal (especially to mountainous situations), they ought to have stood no more than one year in the nursery since the last time of their being re-planted, or two at the most: for when they stand longer and appear more vigorous, there is the greater hazard in their removal; for when they make shoots, it is a sign that the roots have increased greatly in length,

length, by which means the small fibres are at a great distance from the stem, for they are always near the extremities of the large roots; and except more than common care be made use of, the fibres would many of them be cut off in the taking up of the tree, which would either kill or greatly weaken it. I have made many observations of the roots of various kinds of firs and pines a year after planting, both of the living and dead, which informed me the small fibres were the most useful parts of the roots; for those that died had few or none but large ones, and the living-ones I found were chiefly supported by the fibres they were removed with, for the strong ones that had been cut short and had not any fibres upon them decayed, for they never made any new ones through the rind, as they do of most other kinds of trees; from these observations I make it a rule, that whatever tree will not form a branch through the rind above ground, will not make a new fibre through the rind of a strong root. Those trees that are removed annually their strong roots never extend far, and are always full of fibres. It is easily discovered if they have been removed only one year, for if the plant be two or three feet high, the last made shoot will be much shorter than the others below it, if it had been more than one year unremoved before; and if it had been re-planted two years, the last made shoot will be no longer than that under it; and by counting the number of shoots that annually increase in length, shews the number of years it stood unremoved. Some times a tree that lives, makes but a very weak shoot, and scarcely puts out any leaves, or otherwise but very short ones; such trees I should not chuse to take up, for it denotes but few young roots; but those that are full of leaves, of a lively colour, are marks of good roots, and
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in great plenty, notwithstanding the last made shoot may chance to be a short one, and such trees of any size may safely be removed.

The two Mr. Perseits, nursery-men at Pontefract in Yorkshire, take very strict care of their pines and firs; they will not send any that is more than a foot high to a gentleman, but such as were re-planted only a year before. I have had the care of great numbers that came from them, and have not lost in the whole so much as one plant in a hundred, though some times they have been a month upon the road, by the navigations being stopped by ice in the rivers they were brought along; the want of trees being properly removed is the cause of many dying. If a gentleman cannot meet with such trees directly, as have been removed the year before when he desires them, he had better wait a year, than be mortified by the sight of some dead, and others weak in his plantations, as there consequently must be if they had stood long unremoved; contracts might be made with nursery-men to prepare them for the purpose, and it is much safer to do it in the same ground, than to move them to others at a great distance, for in the carriage more of the fibres would be broke off and others dried.

Firs and pines, or any ever-greens and larches, may be removed in mild weather, from September 'till April; but the latter end of March, till the middle of April, I think the safest season: for those planted in the autumn must be exposed to the winds for six months before they can make any new roots, and they often suffer greatly by it; and if trees are to be brought from places at a great distance, it is uncertain of fine weather continuing 'till they are planted, admit it was at the time they were taken up.

Notwith-

Notwithstanding I have recommended the planting of them in the spring, yet the holes ought to be made for them in the winter ; for frost and changes of weather will make the earth fine to put to their roots. The extent and depth of the holes ought to be according to the size and kind of the trees : for the silver fir, pine, after, stone-pine, and others that make tap-roots, ought to have deeper holes, than the ash, pine, larch, spruce fir, and such others whose greatest parts of the roots run horizontally : but there should be extent enough for them to be laid straight, about two inches below the surface ; and if small plants, there is not occasion for any more earth to be laid upon them, but if large, a hill may be raised about six inches higher, and it will help to keep them steadier, but is not of any other service to the trees, therefore it would be as good for them if it was taken away when they have been planted a year : if four cords were fixed to each large tree, and the other ends tied to stakes drove into the ground, there would not require any hill of earth upon the roots ; but a little litter or the like over the roots, would prevent the earth becoming too dry ; and if their young roots were preserved, they would not require any watering ; for the success in planting greatly depends upon the trees being carefully taken up, but as there certainly must be some roots lost, therefore to preserve the health of the tree some branches ought to be taken off ; a few of the strongest will be of as much service as many little ones, and by taking only one or two at every joint, the stem will still remain covered to the bottom, which is an ornament, and likewise makes more shelter in the front of a plantation, than if all the lower branches were taken away.

The small plantations upon each farm ought to be sheltered in like manner : for the winds would
have

have more force upon them than where the number of trees are greater, for those would in some measure be a guard for each other.

The landlord and tenant ought to divide the profits that would arise from the plantations on the farms : for though in reality the tenant pays rent for the land, yet the landlord must be at the expence of planting ; and therefore ought to have a certain number of trees preserved for timber upon each acre, exclusive of the firs in front, for those ought not to be cut down 'till they are dead.

If there be ten trees upon each acre, they will sometime or other be worth the money sunk in planting the whole, with compound interest upon it ; and if the tenant has the poles he will be well paid for the use of the land he rents ; for they would be of great use to him for making fleaks to divide his turneps and many other sorts of fencing ; the willows, fallows, poplars, aspens, and birch, will be fit to cut in ten or a dozen years ; but the ash-poles would not be so large, therefore had better remain 'till the next fall, then they would be fit for many parts of carriages, and likewise ploughs and harrows ; and as it is proper to let the ashes stand longer than the other poles, they ought (at the time of planting) to be dispersed all over the plantation, and not many of them together, for where they stand near each other they do not arrive at a bulk larger than hop-poles ; if one be left at every ten or twelve yards, that will be enough ; and if there be more, they ought to be cut down when the other poles are : and if it be in a country where hop-poles or smart-hoops are not wanted, there ought not to be many more than that number planted ; if coal be dear in the neighbourhood, good burning wood is valuable, and some birches might be left for that

that purpose 'till the second cutting, in like manner as is proposed for ashes.

There ought to be upon every farm as many separate plantations as to have one cut every year ; for cutting only part of a wood at a time, occasions damage to the stock by carriages coming in every year ; and that part standing deprives the other of sun ; the size of each plantation ought to be in proportion to the farm, so as to afford wood sufficient for the tenant's use.

The manner of cutting the wood should be fully specified in the leases ; and a large penalty laid upon both tenant and landlord, if either should injure the other's property ; especially if the tenant was to cut off the top of a tree of any kind that was adapted to stand for timber ; that is a thing too frequently practised, for after that is done the tree is called a pollard, and the branches they make become the tenant's property, and he generally cuts them every nine or ten years ; this is too common a practise where oaks, elms, &c. grow in hedges ; for I have seen many thousands used in that manner, by which they are not fit for many other uses than to burn ; though had they not been headed, would have now been fit for ship-timber, and of great value to the landlords ; I lately observed some oaks, whose bodies are more than three feet in diameter, yet not of much value ; for they have been pollards, though many years since, and by receiving wet at the places where they were cut, the lowest parts of them are decayed ; though by the bulk of their branches above, they do not appear to have been headed within the last sixty years ; they have large spreading tops, though coarse and but of little value ; therefore those that are now pollards would never make good timber ; but by cutting them as usual, they will be more profitable than though their heads were preserved ; yet if there

could be a law that would prevent young ones being made pollards, it would tend greatly to the advantage of landlords, and likewise increase the quantity of timber in the nation.

Such Gentlemen as have great numbers of young trees upon their estates, it is impossible for their stewards daily to observe them all; for that reason, many trees have their tops taken off without the owner's knowledge; but if there was a reward to be given for every informer of such practices, there are many for the sake of gain would make the offenders known.

P A R T the Fifth.

Raising of Wood upon Barren Lands that cannot be plowed.

THERE is some land which produces but little grass of any kind, and cannot be improved by plowing, for the greatest part of its surface is a rock, without any sort of earth upon it; the only method that I know to make an improvement is planting; and I have had experience enough to know, that many kinds of trees will grow in such places, if there be earth enough to cover their roots properly at the time of planting; for when they extend they find cavities in the rocks and make entrance: But as such barren situations are generally mountainous, such kinds of trees should be adapted to them as will resist tempestuous winds.

One sort has been highly recommended for the purpose, yet I think there are others more preferable

able, which I have known to preserve their leading branches, when they have stood single upon the very tops of mountains; whereas the others will not grow strait in a close nursery without being confined to poles; though there is an undeniable relation of there being some of the kind extremely tall, upon a high mountain in a climate much eastward of this nation.

I suppose there have been great numbers there, which have sheltered each other in their youth; but the plants are dear in our nurseries, and but few Gentlemen would purchase a number of them to plant a large tract of land with them only, for at first planting they ought not to be more than five foot apart in high situations, for the nearer they are, the faster they advance in height, by being a fence to each other.

I will recommend such as I have observed to grow tolerably well in the like situations, even some that are sea-marks.

The silver fir; I know one growing almost single, having only two or three low ones about it, upon a very high hill, where it is fully exposed to all winds, from south-west to north-east; it preserves it's leading branch, though it does not advance so much in height as others that I have seen in lower situations.

The spruce and Scotch firs will grow, but the latter is more subject to lose it's head than either of the others, and does not make so valuable wood when cut up for use.

The larches and hollies I have seen grow tolerably well; the sycamore, birch, beech, ash, and oak, the same, where great numbers were together.

When a Gentleman thinks of covering such unprofitable lands with trees, he generally chooses to have it planted that he may early see the improvement; but there would be the most cer-

tainty of success from sowing seed of the fore-mentioned plants in a promiscuous manner, after the land was prepared for their reception.

This sort of land generally has an uneven surface, the highest parts being not any thing else but large bodies of stone, with short moss growing upon them ; and on the other parts of the surface there is some earth with heath, broom, fern, or long moss, growing upon it ; these lowest parts are the properest for trees to grow in, but it must be made clean before either sowing or planting, or otherwise the plants would be smothered, nay, there would be a difficulty of getting earth ; for I have known where it was not any deeper than four or five inches in the best parts, and was full of the sorts of roots I have mentioned lately.

The way to clean it is to take up what is there growing, and lay it in heaps in the places that are properest for planting ; and if it be only grass and long moss it will rot in one summer, by being turned over three or four times in dry weather ; but if there be strong stems and roots of heath or broom, it will be best to burn it in little heaps, one at every place where a tree is intended ; this will destroy both root and branch, and likewise many seeds, and make richer soil than if they only lay 'till rotten. There cannot be any certain distance betwixt each tree, for they must be only where there is earth for them ; but if they could be within a yard of each other it would be better than if further apart. If the seeds be sowed after the combustibles were either rotted or burnt, the hills where they were should be first spread about in those places only where there is some soil, for they will not be of any service where there is not any thing but stone : this work may be done in open weather from November 'till March ; the fir and birch-seeds may be thrown upon the ground without the trouble of covering them,

them, for the frost and rains will give them possession; the others that are larger should have holes made for them in depth proportionable to their size; but for an acorn, which is largest, they need not be above three inches; they will grow as well at one inch deep, but will be more liable to destruction by mice and rooks; as the seeds are not very costly, put in half a dozen where one tree is desired, for it is easy to thin them when too many; and amongst the others that I have mentioned, there may be some of the common alder, which will grow freely, and help to shelter them that make more valuable trees: and likewise white-thorn, but the seeds of it and the ash ought to have been kept in earth a year before, and likewise the holly and yew.

Planting amongst Stones.

THE plants for mountains and rocks ought to be short but very stiff, not having been suffered to grow too near each other in a close and well-sheltered nursery; neither should any of them stand more than a year after they are removed, and that if possible, ought to have been in a situation nearly as open as the place they are intended for, and if a gentleman had a piece of tolerable good land near it, he would find an advantage to move his plants there for one year; it would inure them to the climate, and their roots would not suffer so much in carriage as from places at a great distance.

As there will not be depth of soil amongst rocks to receive long tap-roots, the plants that naturally make them should have them cut off when they are planted in the nursery: but in the taking them up before, all the uppermost roots should be preserved from frosts, sun, or drying winds, and trenches should be made in the nursery to receive

them at full length, not suffering them to be crammed up on a heap; neither should any of their ends be cut off, for those fibres are what the plants must be supported by when their tap-roots are taken off. Plants that are about eighteen inches high may be placed in the nursery, but not nearer than a foot of each other; for standing too close, or weeds being suffered to grow amongst them in the summer, would render them improper for the situation they are to be moved to.

The different kinds of plants make the most agreeable appearance when planted promiscuously; and as to their distance, it cannot possibly be regular, for the rocks will not admit of it; but the places that will receive them, must be examined before the burning of the vegetables that grow there: and some time before planting, let holes be made in those places so deep (if it is possible) as the roots may be covered four inches with earth, for that will be the only thing they can have to keep them steady, as there cannot any stakes be fixed to tie them to.

The best time for planting in bleak situations, is as late in the spring as it can possibly be done with safety; for in April it may reasonably be expected that the most stormy weather is over, and any of those kinds of trees that I mention, may safely be replanted in any part of that month, if they be in a nursery near the place intended for them; for in short carriage their roots may be preserved moist, and their buds (that will be swelled) will be less liable to be broke off, than they would by being brought from places at a great distance.

If the rock be not any more than three inches below the surface, or if it be but two, I would choose to plant upon it, rather than lay earth under the trees, and have not enough to make them fast with above: but it ought to be observed, that

that where they are the least depth in the ground, the higher must the hill be made upon their roots, even so much as to make the covering four inches thick at the least ; their roots should be extended to the full length before any earth is put upon them, and after they are covered, let the earth be trod firm upon them ; but in the time of covering do not move them up and down, for that would only draw the roots upon each other.

In April, May, and June, they must frequently be observed, and the earth made fast to them, as it is possible some plants may be loosened with the winds ; but after that, the living ones will have made new roots that will hold them steady ; the grass or weeds must be taken away from them if any chance to grow ; for they ought to have all the benefit of the sun and air that is possible, to give them strength, that they may be able to resist the winters storms.

The cutting off of tap-roots must certainly lessen the vigour of plants, but there is a necessity of doing it, where there is not a depth of soil to receive them ; and when it is done a year before they are planted upon rocks, their horizontals will be more in number than before, and better able to support them ; such kinds of plants that generally make taps will naturally form new ones, and if there be not depth of soil directly under them, they will extend themselves upon the surface of the rocks, 'till they meet with cavities that will admit of them downwards. I have observed this by trees of various kinds and sizes, that I have seen taken out of such situations ; I have taken notice that the oak and Spanish chesnut prosper the best, when their tap-roots meet with no interruptions ; for in a great depth of earth (that is otherwise agreeable) I have frequently seen much larger trees than upon rocks of hard stone ;
there

there is one kind of elm does the like, for it naturally makes tap-roots, but there are others that do not, and will make large trees upon rocks, and the former will do the like if grafted upon the latter.

There are seven or more distinct kinds of elms, yet I do not know their proper names. I have heard some people call the upright English elm, that is most common about London, the witch elm; but Mr. Cook called another kind by that name, and gave an account of one being immensely large in Sir Walter Paget's park; I have heard many other gentlemen call this latter kind the same as Mr. Cook did, but there is a great difference betwixt the two sorts, both in their leaves, roots, and their manner of growing; the latter has leaves extremely large, and very rough, and of a purple colour; at their first appearance it makes large shoots but not extremely streight, and when they rise to ten or twelve feet high, are more inclinable to spread than grow upright; it makes great plenty of extreme good roots, and will grow well upon rocks, or stony dry land: nay, better than in deep soils, for there it is apt to be top-heavy, and its branches turn downwards: it is this sort that the former will take well upon, by budding or grafting, and grow much better after upon rocks, than if it had roots of it's own kind, for they are never many of them, neither are they well furnished with fibres, but there generally is one strong tap-root to them; this tree grows as much upright as any kind of elm, and its leaves are more ornamental, by making their appearance first in the spring, and remaining on the tree latest in the autumn; and the timber is valuable for naves of carriages, or boring for water works, pipes, and for several other uses when sawed into planks.

There

There are other kinds as good for use, and will grow well upon rocks without being grafted; the one is called by some the black-budded Spanish elm, it's leaves are large, but not so nearly round as the kind I mentioned for grafting upon, but it does not put them out early; it's rind is smooth and of a silver colour; it makes plenty of good roots, and grows tolerably straight, though not quite so regular in it's production of collateral branches as the upright elm.

There is another kind I think as much or more valuable, though I have not seen it in many parts of England, though it is in the North, and I have planted it upon mountains with good success, and even where there was a rock near the surface; the leaves of this kind much resemble those of the hornbeam in shape, though larger; it is very late before they put out, and are shed pretty early in the autumn: it grows very upright, the rinds of the young branches are of a dark brown colour, and full of collaterals placed regular on their opposite sides.

There are other kinds of elms grow upon rocks and mountains, but the kinds I have mentioned I give the preference to.

The beech, silver fir, and larch, are all inclinable to make tap-roots, yet I have seen them prosper very well upon rocks, that were not of the strongest fort.

The Scotch and spruce firs, ash, sycamore, birch, black poplar, fallows, &c. will prosper upon rocks where the soil is thin.

There will be a necessity of thinning these plantations, but as there cannot reasonably be expected upon rocks and mountains any great number of poles, that are either fit for hoops or hop-poles, therefore the thinning of such plantations should be done in a different manner to those where poles are in great perfection; the advantage that will
arise

arise from the wood cut cannot be much, for it will only be fit for fuel : but taking some down may be of great benefit to those left growing ; for a fine straight tree may possibly be galled by the winds beating it's top and others together : and if an oak, that is likely to make a good tree, be the greatest sufferer by being over-headed by one of another kind, I think it ought to be preserved, for oaks deserve the preference before any of the others ; though for the sake of variety of colours, some of all the kinds that were planted ought to be left promiscuously, though thinned at various times.

If the branches of either white or black thorns be observed to gall a fine tree ; let them be cut off ; but many thorns ought to be preserved that are not prejudicial, for many a noble oak has been guarded by them in it's youth, from both storms and cattle : and wherever there are large thorns in a wood that has oaks growing in it, they cause a succession by young ones growing amongst them, notwithstanding there may be cattle suffered to graze upon the land.

The properest season for thinning these kinds of woods is in the latter end of April and beginning of May, for then it may reasonably be imagined, that the great winds are over for that spring ; and shelter will not be so much required till the next autumn.

At the time of thinning, a little proper pruning would be of service to the trees remaining ; for in high situations, most young trees lean to the east, or south-east, by being drove that way by winds from the opposite points ; and they generally have the greatest number of strong branches upon those sides ; some of the largest that grow near the top ought to be taken off ; it will not only lessen the weight that was part of the cause of the trees leaning, but after that, the branches
on

on the other side, and the leading one, will increase faster both in bulk and length.

When firs are very stiff and strong, and do not advance much in height, the upper buds should part be taken off in April, leaving only five of the largest.

If oaks, chesnuts, beech, or any tree (that is not an ever-green) be crooked, make incisions through the rind with the point of a knife, from one end of the hollow part to the other ; it will occasion the tree to increase in bulk more in those parts than the others ; by this method I have known trees that were very much crooked become straight.

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